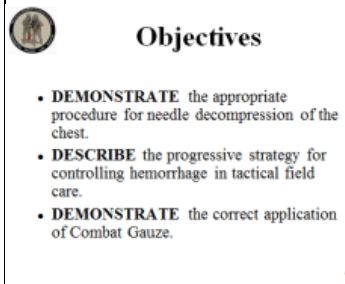
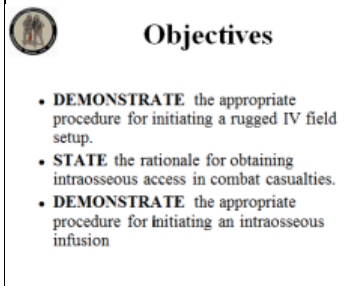
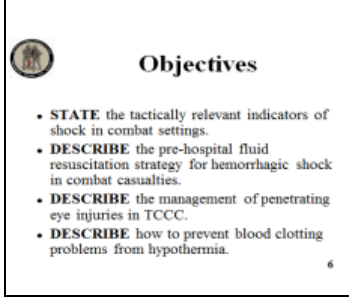
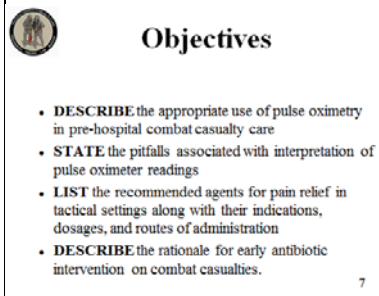
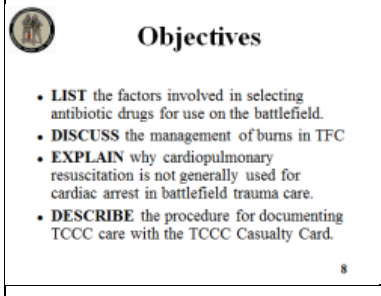
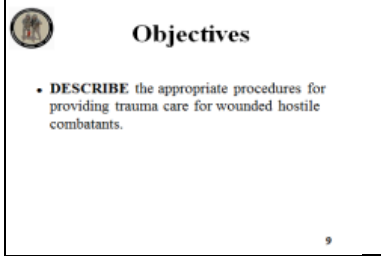
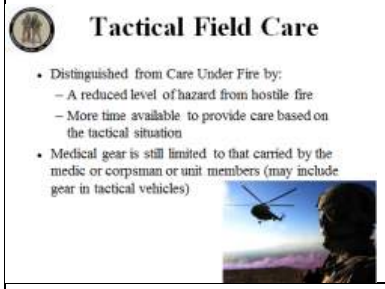
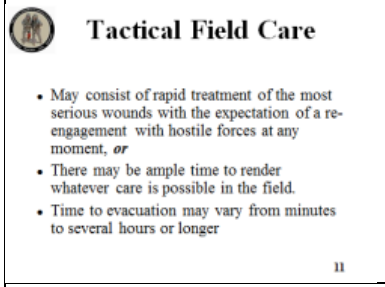
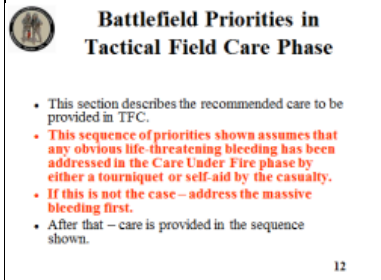
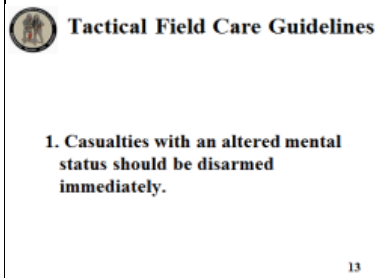
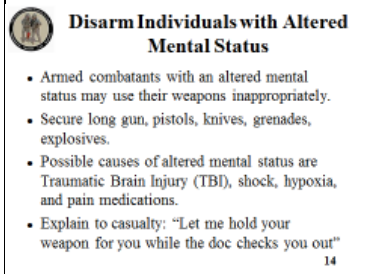
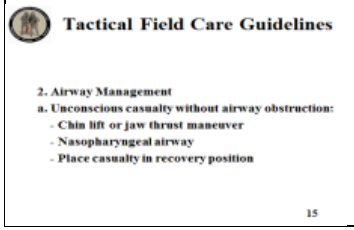
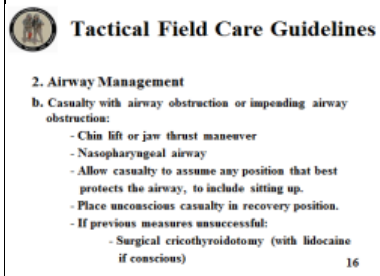
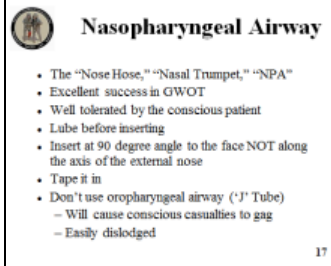
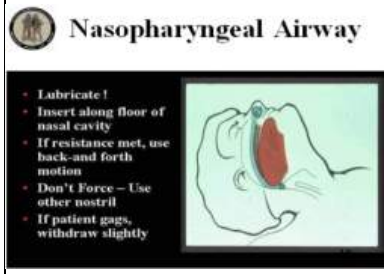
Tactical Combat Casualty Care **November 2010**  **Tactical Field Care**	**Tactical Combat Casualty Care** **August 2011** **Tactical Field Care**	Next we'll be moving into the Tactical Field Care phase of TCCC
 **Objectives** • **STATE** the common causes of altered states of consciousness on the battlefield. • **STATE** why a casualty with an altered state of consciousness should be disarmed. • **DESCRIBE** airway control techniques and devices appropriate to the Tactical Field Care phase. 2	**Objectives** • **STATE** the common causes of altered states of consciousness on the battlefield. • **STATE** why a casualty with an altered state of consciousness should be disarmed. • **DESCRIBE** airway control techniques and devices appropriate to the Tactical Field Care phase.	Read text
 **Objectives** • **DEMONSTRATE** the recommended procedure for surgical cricothyroidotomy. • **LIST** the criteria for the diagnosis of tension pneumothorax on the battlefield. • **DESCRIBE** the diagnosis and initial treatment of tension pneumothorax on the battlefield. 3	**Objectives** • **DEMONSTRATE** the recommended procedure for surgical cricothyroidotomy. • **LIST** the criteria for the diagnosis of tension pneumothorax on the battlefield. • **DESCRIBE** the diagnosis and initial treatment of tension pneumothorax on the battlefield.	Read text

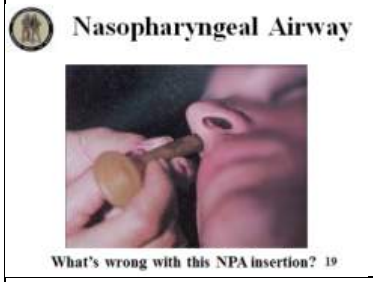
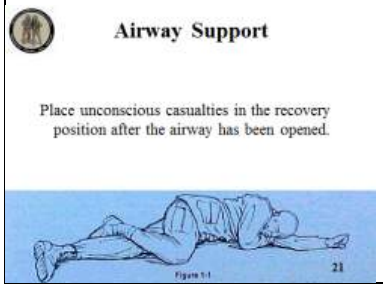
	**Objectives** • **DEMONSTRATE** the appropriate procedure for needle decompression of the chest. • **DESCRIBE** the progressive strategy for controlling hemorrhage in tactical field care. • **DEMONSTRATE** the correct application of Combat Gauze.	Read text
	**Objectives** • **DEMONSTRATE** the appropriate procedure for initiating a rugged IV field setup. • **STATE** the rationale for obtaining intraosseous access in combat casualties. • **DEMONSTRATE** the appropriate procedure for **i**nitiating an intraosseous infusion.	Read text
	**Objectives** • **STATE** the tactically relevant indicators of shock in combat settings. • **DESCRIBE** the pre-hospital fluid resuscitation strategy for hemorrhagic shock in combat casualties. • **DESCRIBE** the management of penetrating eye injuries in TCCC. • **DESCRIBE** how to prevent blood clotting problems from hypothermia.	Read text

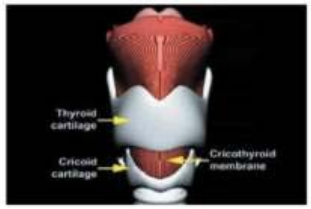
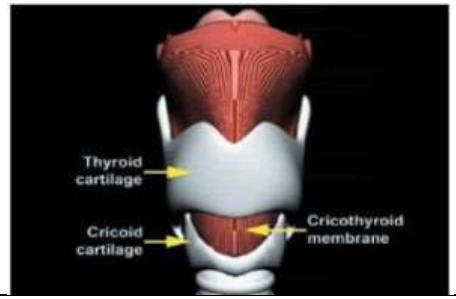
	**Objectives** • **DESCRIBE** the appropriate use of pulse oximetry in pre-hospital combat casualty care • **STATE** the pitfalls associated with interpretation of pulse oximeter readings • **LIST** the recommended agents for pain relief in tactical settings along with their indications, dosages, and routes of administration • **DESCRIBE** the rationale for early antibiotic intervention on combat casualties.	Read text
	**Objectives** • **LIST** the factors involved in selecting antibiotic drugs for use on the battlefield. • **DISCUSS** the management of burns in TFC • **EXPLAIN** why cardiopulmonary resuscitation is not generally used for cardiac arrest in battlefield trauma care. • **DESCRIBE** the procedure for documenting TCCC care with the TCCC Casualty Card.	Read text
	**Objectives** • **DESCRIBE** the appropriate procedures for providing trauma care for wounded hostile combatants.	Read text

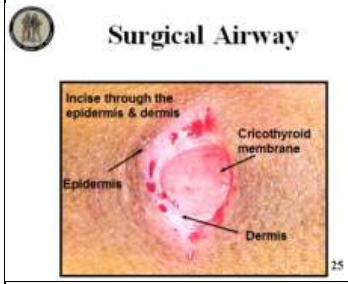
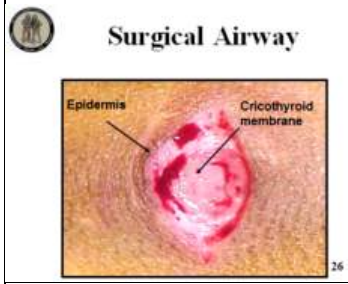
	**Tactical Field Care** • Distinguished from Care Under Fire by: o A reduced level of hazard from hostile fire o More time available to provide care based on the tactical situation • Medical gear is still limited to that carried by the medic or corpsman or unit members (may include gear in tactical vehicles)	Now the shooting has stopped – or the fire is ineffective. Does not mean that the danger is over – could be in Care Under Fire phase again anytime in the tactical setting.
	**Tactical Field Care** • May consist of rapid treatment of the most serious wounds with the expectation of a re-engagement with hostile forces at any moment, ***or*** • There may be ample time to render whatever care is possible in the field. • Time to evacuation may vary from minutes to several hours or longer	This phase of care may be very prolonged.
	**Battlefield Priorities in Tactical Field Care Phase** • This section describes the recommended care to be provided in TFC. • **This sequence of priorities shown assumes that any obvious life-threatening bleeding has been addressed in the Care Under Fire phase by either a tourniquet or self-aid by the casualty.** • **If this is not the case – address the massive bleeding first.** • After that – care is provided in the sequence shown.	You may have multiple casualties with multiple problems. What problems do you address first? Before we show you – we have to note one assumption.

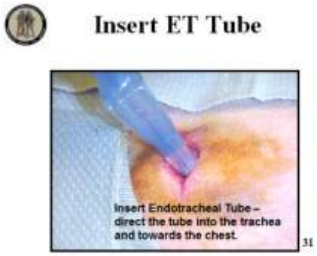
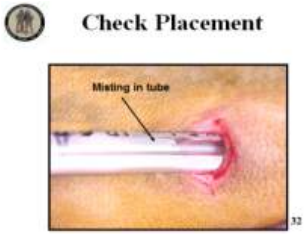
	**Tactical Field Care Guidelines** **1. Casualties with an altered mental status should be disarmed immediately.**	All of the slides titled "Tactical Field Care Guidelines" - as this one is - should be read verbatim.
	**Disarm Individuals with Altered Mental Status** • Armed combatants with an altered mental status may use their weapons inappropriately. • Secure long gun, pistols, knives, grenades, explosives. • Possible causes of altered mental status are Traumatic Brain Injury (TBI), shock, hypoxia, and pain medications. • Explain to casualty: "Let me hold your weapon for you while the doc checks you out"	Casualty may resist being disarmed. The proposed comment in the last bullet may help him to better accept your taking his weapon.
	**Tactical Field Care Guidelines** **2. Airway Management** **a. Unconscious casualty without airway obstruction:** **- Chin lift or jaw thrust maneuver** **- Nasopharyngeal airway** **- Place casualty in recovery position**	Read text

	**Tactical Field Care Guidelines** **2. Airway Management** **b. Casualty with airway obstruction or impending airway obstruction:** **- Chin lift or jaw thrust maneuver** **- Nasopharyngeal airway** **- Allow casualty to assume any position that best protects the airway, to include sitting up.** **- Place unconscious casualty in recovery position.** **- If previous measures unsuccessful:** **- Surgical cricothyroidotomy (with lidocaine if conscious)**	Read text
	**Nasopharyngeal Airway** • The "Nose Hose," "Nasal Trumpet," "NPA" • Excellent success in GWOT • Well tolerated by the conscious patient • Lube before inserting • Insert at 90 degree angle to the face NOT along the axis of the external nose • Tape it in • Don't use oropharyngeal airway ('J' Tube) o Will cause conscious casualties to gag o Easily dislodged	The oropharyngeal airway is more easily dislodged and more likely to cause gagging in a conscious casualty. -NPA is better tolerated by a conscious patient
	**Nasopharyngeal Airway** 	Lubricate! Gentle insertion with rotary or back and forth motion Don't start a big nosebleed Some people have deviated nasal septums – try the other side if it doesn't go in the first side of the nose tried.

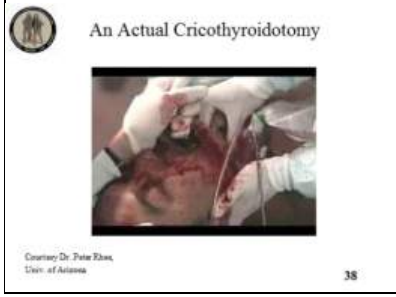
	**Nasopharyngeal Airway** **What's wrong with this NPA insertion?**	This nasopharyngeal airway is being inserted towards the brain and may end up there! The correct angle for insertion is 90 degrees to the frontal plane of the face. NOT along the log axis of the nose.
	**Maxillofacial Trauma** • Casualties with severe facial injuries can often protect their • own airway by sitting up and leaning forward. • Let them do it if they can!	It would be almost impossible to intubate a casualty with this kind of injury, especially on the battlefield at night. If his larynx and trachea are intact, he may do well. This casualty was treated with an emergency surgical airway. The only way they got this casualty alive to the ER was to let him sit up and lean forward. May have to do a surgical airway with casualty in the sitting position.
	**Airway Support** Place unconscious casualties in the recovery position after the airway has been opened.	Recovery position helps to protect against vomiting and aspiration. Again note that C-spine immobilization is not required in penetrating head and neck trauma.

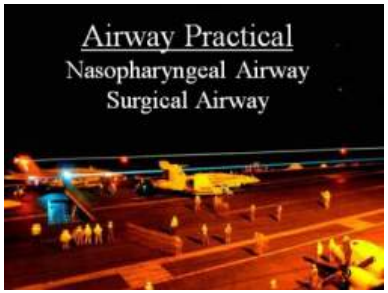
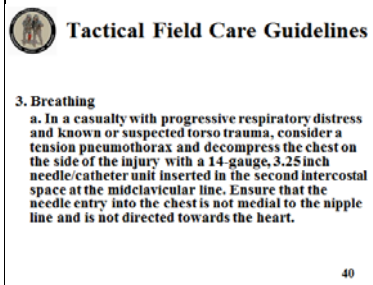
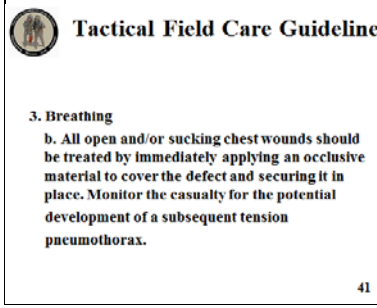
Surgical Airway (Cricothyroidotomy) • This series of slides and the video demonstrate a horizontal incision technique for performing a surgical airway. • A vertical incision technique is preferred by many trauma specialists and is recommended in the Iraq/Afghanistan War Surgery textbook. • Steps are the same except for the orientation of the incision. • Use a 6.0 tube for the airway 22	**Surgical Airway (Cricothyroidotomy)** • This series of slides and the video demonstrate a horizontal incision technique for performing a surgical airway. • A vertical incision technique is preferred by many trauma specialists and is recommended in the Iraq/Afghanistan War Surgery textbook. • Steps are the same except for the orientation of the incision. • Use a 6.0 tube for the airway	So how do you do a surgical airway?
Surgical Airway (Cricothyroidotomy) 	**Surgical Airway (Cricothyroidotomy)** 	Here are the landmarks. You want to make the incision right over the cricothyroid membrane. The thyroid cartilage is the “Adam’s Apple” in men.
Surgical Incision over Cricothyroid Membrane  24	**Surgical Incision over Cricothyroid Membrane** 	Make a surgical incision over the cricothyroid membrane. These slides show a transverse incision, but many experts recommend making a longitudinal incision overlying the trachea in the midline. A longitudinal incision has two advantages: first, it avoids the recurrent laryngeal nerves which run parallel along each side of the trachea, and second, unlike a transverse incision, it can be extended up or down if needed to get over the cricothyroid membrane if the initial incision is in the wrong place.

	**Surgical Airway**	Get through the skin layers.
	**Surgical Airway**	Higher magnification view Use digital palpation to double-check the location f the cricothyroid membrane
	**Surgical Airway** **Single stabbing incision through cricothyroid membrane**	Straight in with the scalpel for this step.
	**Surgical Airway** *****You do not slice, you stab, the membrane*****	Should get an opening into an air space.

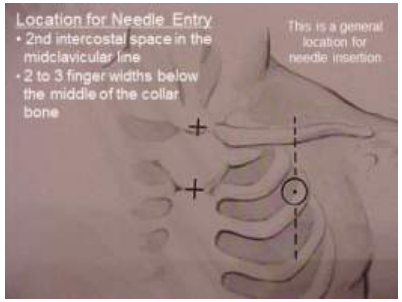
	**Surgical Airway** **Insert the scalpel handle and rotate 90 degrees**	Enlarge the hole bluntly by doing this.
	**Surgical Airway** **Insert Mosquito hemostat into incision and dilate**	Cric hook might work better here than mosquito forceps. The tips of the mosquito forceps might also tear the cuff of the endotracheal tube
	**Insert ET Tube**	Direct posteriorly on entry, then aim south towards the chest to assure tracheal positioning.
	**Check Placement**	Auscultation is difficult in the tactical setting. Misting in the tube provides evidence that air is moving through the tube.

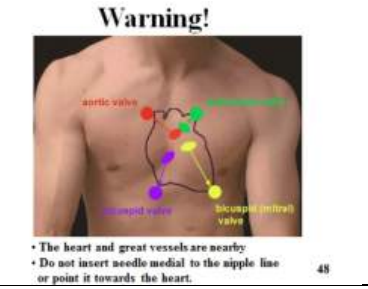
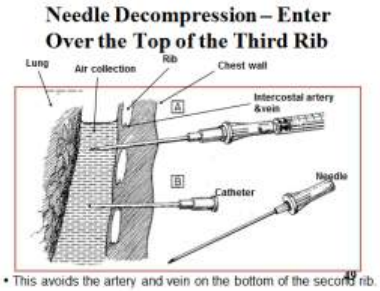
	**Inflating the Cuff** **Note: Corpsman/medic may wish to cut ET tube off just above the inflation tube so it won't be sticking out so far.**	Make sure the inflation tube is not cut!
	**Ventilate**	**No need for ventilation if casualty is breathing spontaneously.** Most casualties will not require ventilation "When you need a breath, they need a breath" Don't hyperventilate – use your own breathing rate as a guide to ventilation frequency.
	**Secure the Tube** At this point, the tube should be taped securely in place with surgical tape.	The tube will come out if you don't tape it in place. If neck is wet with blood, tape around the tube then around the neck. (Not too tight around neck.)

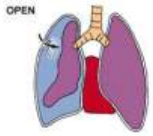
	**Dress the Wound** Tape a gauze dressing over the surgical airway site.	Be sure to tape securely – skin is slippery when wet.
	**Surgical Airway Video**	Let's watch a video on how to do a surgical airway. Again – this shows a transverse incision. Many prefer an in-line incision.
	An Actual Cricothyroidotomy Courtesy Dr. Peter Rhee, Univ. of Arizona	This is video of a cricothyroidotomy performed in an actual emergency situation.

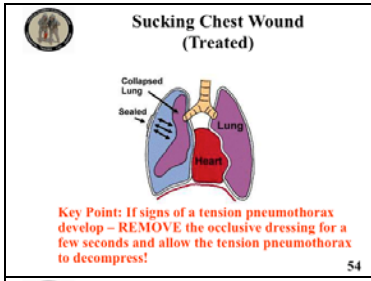
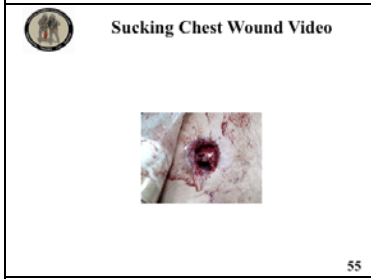
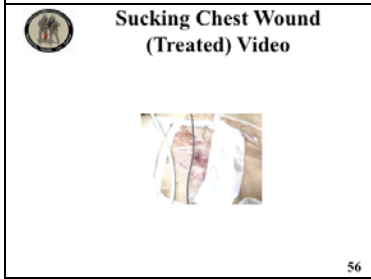
	Airway Practical Nasopharyngeal Airway Surgical Airway	Nasopharyngeal airway skill sheet Surgical airway skill sheet
	**Tactical Field Care Guidelines** **3. Breathing** **a. In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart.**	Read text
	**Tactical Field Care Guidelines** **3. Breathing** **b. All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax.**	Read text

Tension Pneumothorax • Tension pneumothorax is another common cause of preventable death encountered on the battlefield. • Easy to treat • Tension pneumo may occur with entry wounds in abdomen, shoulder, or neck. • Blunt (motor vehicle accident) or penetrating trauma (GSW) may also cause 42	**Tension Pneumothorax** • **Tension pneumothorax is another common cause of preventable death encountered on the battlefield.** • **Easy to treat** • Tension pneumo may occur with entry wounds in abdomen, shoulder, or neck. • Blunt (motor vehicle accident) or penetrating trauma (GSW) may also cause	Two things about a tension pneumothorax: - Very common cause of preventable death on the battlefield - It can be effectively treated by combat medics, corpsmen, and PJs
Pneumothorax  A pneumothorax is a collection of air between the lungs and chest wall due to an injury to the chest and/or lung. The lung then collapses as shown.43	**Pneumothorax** A pneumothorax is a collection of air between the lungs and chest wall due to an injury to the chest and/or lung. The lung then collapses as shown.	Normally the lung fills up the entire chest cavity. With injury, air may get between the chest wall and the lung and cause the lung to collapse. Air is supposed to be INSIDE the lung. Here the air is inside the chest but OUTSIDE the lung – does not help get oxygen to the body.
Tension Pneumothorax  **A tension pneumothorax is worse. Injured lung tissue acts as a one-way valve, trapping more and more air between the lung and the chest wall. Pressure builds up and compresses both lungs and the heart.** 44	**Tension Pneumothorax** **A tension pneumothorax is worse. Injured lung tissue acts as a one-way valve, trapping more and more air between the lung and the chest wall. Pressure builds up and compresses both lungs and the heart.**	Every breath adds more air into the air space outside the lung. The air can't be exhaled because it's outside the lung – no way to escape - pressure builds up.

Tension Pneumothorax • Both lung function and heart function are impaired with a tension pneumothorax, causing respiratory distress and shock. • Treatment is to let the trapped air under pressure escape • Done by inserting a needle into the chest • 14 gauge and 3.25 inches long is the recommended needle size 45	**Tension Pneumothorax** • **Both lung function and heart function are impaired with a tension pneumothorax, causing respiratory distress and shock.** • Treatment is to let the trapped air under pressure escape • Done by inserting a needle into the chest • 14 gauge and 3.25 inches long is the recommended needle size	One collapsed lung should not kill you, but the elevated air pressure OUTSIDE the collapsed lung in a tension pneumothorax can impair the function of the good lung and the heart by preventing them from expanding normally. This CAN kill you. Study by Dr. Harcke in 2008 Published in Military Medicine Several casualties died from needles being too short to get through the chest wall Old 2 inch needles were to short 3.25 inch needles will get through the chest wall in 99% of individuals
Tension Pneumothorax • Question: "What if the casualty does not have a tension pneumothorax when you do your needle decompression?" • Answer: – If he has penetrating trauma to that side of the chest, there is already a collapsed lung and blood in the chest cavity. – The needle won't make it worse if there is no tension pneumothorax. – If he DOES have a tension pneumothorax, you will save his life. 46	**Tension Pneumothorax** • Question: "What if the casualty does not have a tension pneumothorax when you do your needle decompression?" • Answer: ▪ If he has penetrating trauma to that side of the chest, there is already a collapsed lung and blood in the chest cavity. ▪ The needle won't make it worse if there is no tension pneumothorax. ▪ If he DOES have a tension pneumothorax, you will save his life.	Let's ask a question here.
	<u>Location for Needle Entry</u> • 2nd intercostal space in the midclavicular line • 2 to 3 finger widths below the middle of the collar bone	WHERE exactly does the needle go? First – goes on the SAME SIDE OF THE CHEST AS THE INJURY.

	**Warning!** • **The heart and great vessels are nearby** • **Do not insert needle medial to the nipple line or point it towards the heart.**	This is an outline of the location of the heart drawn on the surface of the chest.
	**Needle Decompression – Enter Over the Top of the Third Rib**	Emphasis on 90 degree angle to chest wall on entry. Above the rib.
	**Remember!!!** • **Tension pneumothorax is a common but easily treatable cause of preventable death on the battlefield.** • **Diagnose and treat aggressively!**	DO NOT MISS THIS INJURY!

 Needle Decompression Practical 51	**Needle Decompression Practical**	Needle Decompression Skill Sheet
Sucking Chest Wound (Open Pneumothorax)  Takes a hole in the chest the size of a nickle or bigger for this to occur. 52	**Sucking Chest Wound (Open Pneumothorax)** **Takes a hole in the chest the size of a nickle or bigger for this to occur.**	In a sucking chest wound, air enters the pleural space through a wound in the chest wall. The elastic lung deflates and pulls away from the chest wall. On inspiration, the air now enters the chest THROUGH THE HOLE instead of INTO THE LUNGS. The affected lung cannot be fully re-inflated by inhalation.
Sucking Chest Wound • May result from large defects in the chest wall and may interfere with ventilation • **Treat by applying an occlusive dressing completely over the defect during expiration.** • Monitor for possible development of subsequent tension pneumothorax. • Allow the casualty to be in the sitting position if breathing is more comfortable. 53	**Sucking Chest Wound** • **May result from large defects in the chest wall and may interfere with ventilation** • **Treat by applying an occlusive dressing completely over the defect during expiration.** • **Monitor for possible development of subsequent tension pneumothorax.** • **Allow the casualty to be in the sitting position if breathing is more comfortable.**	Apply during expiration. At this point in the breathing cycle, there is relatively less air in the pleural space.

	**Sucking Chest Wound (Treated)** **Key Point: If signs of a tension pneumothorax develop – REMOVE the occlusive dressing for a few seconds and allow the tension pneumothorax to decompress!**	Once the wound has been occluded with a dressing, air can no longer enter (or exit) the pleural space. The injured lung will remain partially collapsed, but the mechanics of respiration will be better. You have to be alert for the possible development of Tension Pneumothorax because air can still leak into the pleural space from the injured lung. Monitor these patients with observation and a pulse ox.
	**Sucking Chest Wound Video**	Video of a sucking chest wound. Note the large open hole in the chest wall.
	**Sucking Chest Wound (Treated) Video**	Negative pressure during inhalation retracts the dressing over the wound. The lung now has a better chance of re-inflating. Some treat this with Asherman or Hyfin valved dressings. No evidence to show that these dressings or a three-sided dressing are more effective than a simple occlusive dressing. Simple occlusive dressings are easier to apply than constructing 3-sided dressings.
	**Questions?**	

 Tactical Field Care Guidelines 4. Bleeding a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2-3 inches above wound. 58	**Tactical Field Care Guidelines** **4. Bleeding** **a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2-3 inches above wound.**	Read text
 Tactical Field Care Guidelines 4. Bleeding b. For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than two hours), use Combat Gauze® as the hemostatic agent of choice. Combat Gauze ® should be applied with at least 3 minutes of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury (TBI)). If a lower extremity wound is not amenable to tourniquet application and cannot be controlled by hemostatics/dressings, consider immediate application of mechanical direct pressure, including CoTCCC -recommended devices such as the Combat Ready Clamp (CRoC®). 59	**Tactical Field Care Guidelines** **4. Bleeding** **b. For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than two hours), use Combat Gauze® as the hemostatic agent of choice. Combat Gauze ® should be applied with at least 3 minutes of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury (TBI)). If a lower extremity wound is not amenable to tourniquet application and cannot be controlled by hemostatics/dressings, consider immediate application of mechanical direct pressure, including CoTCCC -recommended devices such as the Combat Ready Clamp (CRoC®).**	Read text
 Tactical Field Care Guidelines 4. Bleeding c. Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, replace tourniquet over uniform with another applied directly to skin 2-3 inches above wound. If tourniquet is not needed, use other techniques to control bleeding. 60	**Tactical Field Care Guidelines** **4. Bleeding** **c. Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, replace tourniquet over uniform with another applied directly to skin 2-3 inches above wound. If tourniquet is not needed, use other techniques to control bleeding.**	Tourniquets placed hastily over uniform items may be less effective than tourniquets applied directly to the skin. During reassessment, if a tourniquet needs to be repositioned, remove sufficient uniform materiel to place another tourniquet directly over the skin and tighten it. The initial tourniquet can now be released to assess for continued bleeding control.

 **Tactical Field Care Guidelines** **4. Bleeding** **d. When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse.** 61	**Tactical Field Care Guidelines** **4. Bleeding** **d. When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse.**	Although a tourniquet may stop the active bleeding, it also prevents venous blood from returning to the heart. If arterial blood continues to flow past the tourniquet, pressure can build up distally in the limb and create a compartment syndrome. This is why the tourniquet should be tightened until there is no longer a distal pulse – to minimize chance of harm from a developing compartment syndrome.
 **Tactical Field Care Guidelines** **4. Bleeding** **e. Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker.** 62	**Tactical Field Care Guidelines** **4. Bleeding** **e. Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker.**	Read text
 **Tourniquets: Points to Remember** • Damage to the arm or leg is rare if the tourniquet is left on for less than two hours. • Tourniquets are often left in place for several hours during surgical procedures. • In the face of massive extremity hemorrhage, it is better to accept the small risk of damage to the limb than to have a casualty bleed to death. 63	**Tourniquets: Points to Remember** •Damage to the arm or leg is rare if the tourniquet is left on for less than two hours. •Tourniquets are often left in place for several hours during surgical procedures. •In the face of massive extremity hemorrhage, it is better to accept the small risk of damage to the limb than to have a casualty bleed to death.	Tourniquets have historically been frowned upon in civilian trauma settings. **In combat settings, they are the biggest lifesaver on the battlefield!** They are NOT A PROBLEM if not left in place for too long.
 **Tourniquets: Points to Remember** • All unit members should have a CoTCCC-approved tourniquet at a standard location on their battle gear. – Should be easily accessible if wounded – **DO NOT** bury it at the bottom of your pack • Tourniquets should be left in their protective packaging until needed to treat casualties. – Harsh environments may contribute to tourniquet failure if not left in packaging 64	**Tourniquets: Points to Remember** •All unit members should have a CoTCCC-approved tourniquet at a standard location on their battle gear. –Should be easily accessible if wounded – **DO NOT** bury it at the bottom of your pack •Tourniquets should be left in their protective packaging until needed to treat casualties. –Harsh environments may contribute to tourniquet failure if not left in packaging	Each soldier having a tourniquet at the unit's standardized location is critical, and should be a pre-mission inspection item.

Tourniquets: Points to Remember • Training tourniquets should never be used as mission tourniquets • Repetitive applications may cause tourniquet failure 65	**Tourniquets: Points to Remember** •Training tourniquets should never be used as mission tourniquets •Repetitive applications may cause tourniquet failure	Only tourniquets within their shelf life and still in their original packaging should be issued for mission use.
Tourniquets: Points to Remember • When a tourniquet has been applied, **DO NOT** periodically loosen it to allow circulation to return to the limb. – Causes unacceptable additional blood loss – It HAS been happening, and caused at least one near-fatality in 2005 66	**Tourniquets: Points to Remember** •When a tourniquet has been applied, **DO NOT** periodically loosen it to allow circulation to return to the limb. –Causes unacceptable additional blood loss –It HAS been happening, and caused at least one near-fatality in 2005	Periodically loosening the tourniquet to allow intermittent flow to the limb is an unnecessary practice in the first place, and allows further blood loss in a casualty who cannot afford it.
Tourniquets: Points to Remember Tightening the tourniquet enough to eliminate the distal pulse will help to ensure that all bleeding is stopped, and that there will be no damage to the extremity from blood entering the extremity but not being able to get out.  67	**Tourniquets: Points to Remember** Tightening the tourniquet enough to eliminate the distal pulse will help to ensure that all bleeding is stopped, and that there will be no damage to the extremity from blood entering the extremity but not being able to get out.	This condition is called Compartment Syndrome. It can cause unnecessary loss of the extremity.
Removing the Tourniquet ***Do not remove the tourniquet if:*** – The extremity distal to the tourniquet has been traumatically amputated. – The casualty is in shock. – The tourniquet has been on for more than 6 hours. – The casualty will arrive at a medical treatment facility within 2 hours after time of application. – Tactical or medical considerations make transition to other hemorrhage control methods inadvisable. 68	**Removing the Tourniquet** ***Do not remove the tourniquet if:*** –The extremity distal to the tourniquet has been traumatically amputated. –The casualty is in shock. –The tourniquet has been on for more than 6 hours. –The casualty will arrive at a medical treatment facility within 2 hours after time of application. –Tactical or medical considerations make transition to other hemorrhage control methods inadvisable.	Pay very close attention to these rules about tourniquet removal. These are taken from the U.S. Army guidelines on this point.

Removing the Tourniquet • Consider removing the tourniquet if bleeding can be controlled by other methods. • Only a combat medic/corpsman/PJ, a PA, or a physician should loosen tourniquets.  69	**Removing the Tourniquet** •Consider removing the tourniquet if bleeding can be controlled by other methods. •Only a combat medic/corpsman/PJ, a PA, or a physician should loosen tourniquets.	It may become advantageous during TFC to try to use other methods of hemorrhage control, and to try to loosen the tourniquet. Reasons to consider transitioning to less restrictive bleeding control options: - Evacuation times will be delayed beyond two hours. - Tourniquet pain is difficult to treat.
Removing the Tourniquet • Loosen the tourniquet slowly. – Observe for bleeding. • Apply Combat Gauze to the wound per instructions later in the presentation if wound is still bleeding. • If bleeding remains controlled, cover the Combat Gauze with a pressure dressing. – Leave loose tourniquet in place. • If bleeding is not controlled without the tourniquet, re-tighten it. 70	**Removing the Tourniquet** •Loosen the tourniquet slowly. –Observe for bleeding. •Apply Combat Gauze to the wound per instructions later in the presentation if wound is still bleeding. •If bleeding remains controlled, cover the Combat Gauze with a pressure dressing. –Leave loose tourniquet in place. •If bleeding is not controlled without the tourniquet, re-tighten it.	Don't take the tourniquet off and discard it. You may need it if the bleeding starts up again.
TCCC **Hemostatic Agent**  QuikClot® Combat Gauze™ 71	**TCCC Hemostatic Agent** **QuikClot® Combat Gauze™**	You may have learned about HemCon® and QuickClot® in previous TCCC courses.
Combat Gauze • Combat Gauze has been shown in lab studies to be more effective than the previous hemostatic agents HemCon® and QuikClot ®. • Both Army (USAISR) and Navy (NMRC) studies confirmed  72	**Combat Gauze** •Combat Gauze has been shown in lab studies to be more effective than the previous hemostatic agents HemCon® and QuikClot ®. •Both Army (USAISR) and Navy (NMRC) studies confirmed	Two research studies by the Army and the Navy have demonstrated that Combat Gauze™ is superior to previous agents (HemCon® and QuikClot®) used in TCCC.

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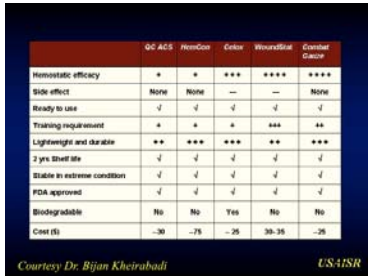
<td> 
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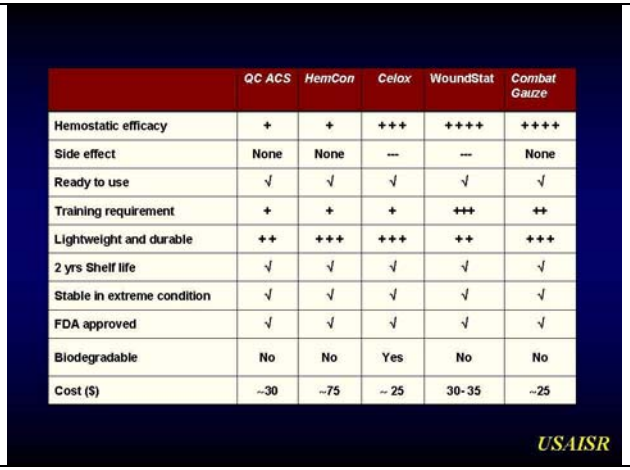
<td> 
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<td>Notice the efficacy comparison in the top row.
Combat Gauze definitively outperformed HemCon® and QuikClot®.</td>
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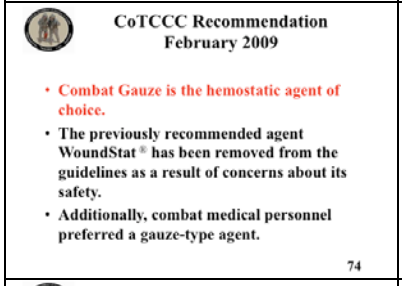
<td> 
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<td>CoTCCC Recommendation
February 2009

•Combat Gauze is the hemostatic agent of choice.
•The previously recommended agent WoundStat® has been removed from the guidelines as a result of concerns about its safety.
•Additionally, combat medical personnel preferred a gauze-type agent.</td>
<td>Gauze-type agents are easier to use on the battlefield than powder-type agents.
This is especially true for wounds with a big bleeder at the bottom of a narrow wound tract.</td>
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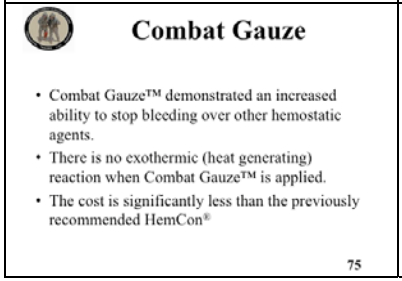
<td> 
</td>
<td>Combat Gauze

•Combat Gauze™ demonstrated an increased ability to stop bleeding over other hemostatic agents.
•There is no exothermic (heat generating) reaction when Combat Gauze™ is applied.
•The cost is significantly less than the previously recommended HemCon®</td>
<td>Combat Gauze demonstrated an increased ability to stop bleeding.</td>
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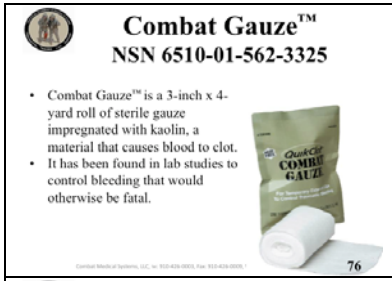
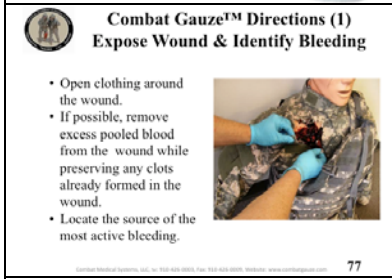
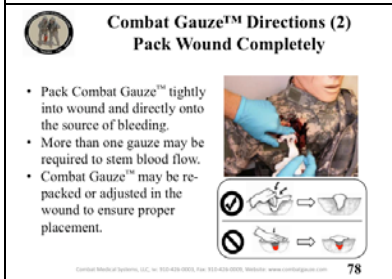
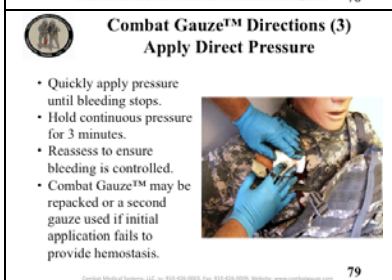
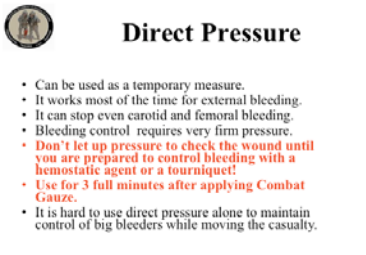
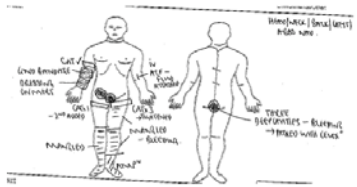
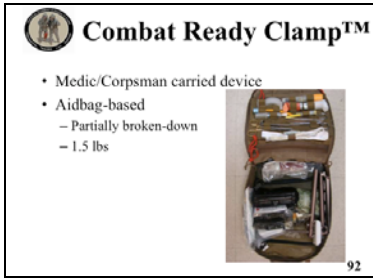
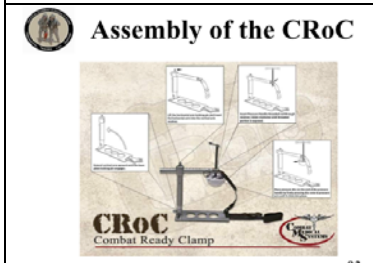
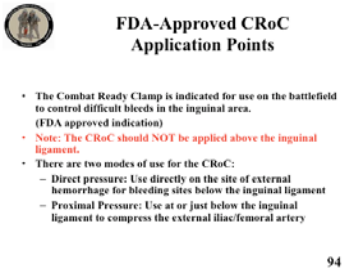
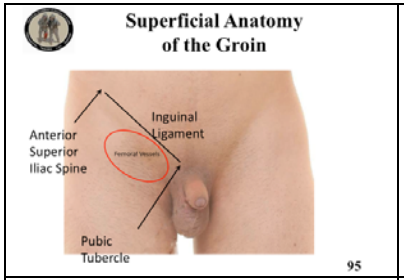
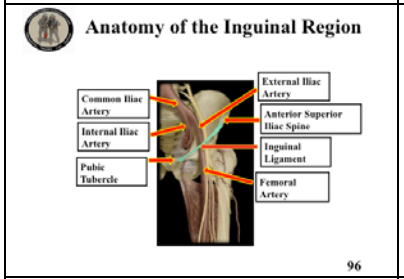
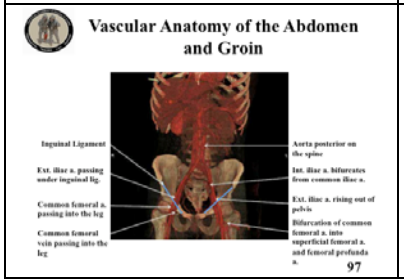
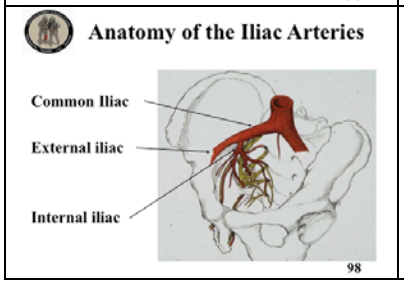
	**Combat Gauze™** **NSN 6510-01-562-3325** •Combat Gauze™ is a 3-inch x 4-yard roll of sterile gauze impregnated with kaolin, a material that causes blood to clot. •It has been found in lab studies to control bleeding that would otherwise be fatal.	Combat Gauze™ is a rolled gauze similar to Kerlix™, but is impregnated with kaolin which helps promote blood clotting.
	**Combat Gauze™ Directions (1)** **Expose Wound & Identify Bleeding** •Open clothing around the wound. •If possible, remove excess pooled blood from the wound while preserving any clots already formed in the wound. •Locate the source of the most active bleeding.	Read Text
	**Combat Gauze™ Directions (2)** **Pack Wound Completely** •Pack Combat Gauze™ tightly into wound and directly onto the source of bleeding. •More than one gauze may be required to stem blood flow. •Combat Gauze™ may be re-packed or adjusted in the wound to ensure proper placement.	Pack CG into wound just like you would plain gauze. If more than one roll is needed, pack in more CG until the wound is full.
	**Combat Gauze™ Directions (3)** **Apply Direct Pressure** •Quickly apply pressure until bleeding stops. •Hold continuous pressure for 3 minutes. •Reassess to ensure bleeding is controlled. •Combat Gauze™ may be repacked or a second gauze used if initial application fails to provide hemostasis.	Although the Combat Gauze™ may become saturated during the initial application process, continue to hold firm pressure for at least three minutes. The kaolin will continue to leach into the wound area and help form a clot even though the bandage is soaked through.

	**Combat Gauze™ Directions (4)** **Bandage over Combat Gauze™** •Leave Combat Gauze™ in place. •Wrap to effectively secure the dressing in the wound. Although the Emergency Trauma Bandage is shown in this picture, the wound may be secured with any compression bandage, Ace™ wrap, roller gauze, or cravat.	The Combat Gauze™ may become saturated. Carefully observe for blood continuing to pool from under the gauze to determine if bleeding has been controlled. Once you are sure the bleeding has stopped, apply a pressure bandage over the Combat Gauze™.
	**Combat Gauze™ Directions (5)** **Transport & Monitor Casualty** •Do not remove the bandage or Combat Gauze™. •Transport casualty to next level of medical care as soon as possible.	Re-check the dressing frequently, especially while transporting the casualty to next level of care. Watch for re-bleeding.
	**Combat Gauze Video**	This video shows Combat Gauze being used to control severe bleeding.
	**Direct Pressure** •Can be used as a temporary measure. •It works most of the time for external bleeding. •It can stop even carotid and femoral bleeding. •Bleeding control requires very firm pressure. **•Don't let up pressure to check the wound until you are prepared to control bleeding with a hemostatic agent or a tourniquet!** **•Use for 3 full minutes after applying Combat Gauze.** •It is hard to use direct pressure alone to maintain control of big bleeders while moving the casualty.	Even just a firmly applied thumb may work with big bleeders in small wound tracts. One combat medic has used a thumb successfully in two casualties. One had carotid bleeding – the other had femoral bleeding.

	**Questions?**	
Combat Gauze™ Practical  85	**Combat Gauze™ Practical**	Break into small groups for practical
Junctional Hemorrhage • Term used to include: – Groin – Buttocks – Perineum – Axilla – Base of neck 86	**Junctional Hemorrhage** •Term used to include: – Groin – Buttocks – Perineum – Axilla – Base of neck	The areas where the neck and the limbs join the torso are “junctional” areas. Hemorrhage from wounds in these areas cannot be controlled by application of standard tourniquets like the C.A.T.
Junctional Hemorrhage  87	**Junctional Hemorrhage**	This is an excerpt from a treatment record of an actual casualty. The drawing shows the locations of extensive injuries to the lower extremities, groin, and buttocks. Hemorrhage from the groin and buttock injuries was not controlled by the C.A.T.s applied to the upper thighs.

Junctional Hemorrhage "An ongoing USAISR analysis of the cause of death in recent U.S. fatalities from Afghanistan and Iraq has noted that the most common cause of preventable deaths at present is junctional hemorrhage from proximal lower extremity amputations and groin injuries." *Eastridge and Mabry* *CoTCCC Meeting 3 August 2011* 88	**Junctional Hemorrhage** "An ongoing USAISR analysis of the cause of death in recent U.S. fatalities from Afghanistan and Iraq has noted that the most common cause of preventable deaths at present is junctional hemorrhage from proximal lower extremity amputations and groin injuries." ***Eastridge and Mabry*** ***CoTCCC Meeting 3 August 2011***	Bleeding from extremity wounds is no longer the most common cause of preventable death on the battlefield. IED blasts causing amputations of the legs and groin injuries are responsible for numerous fatalities. USAISR = Army Institute of Surgical Research.
Junctional Hemorrhage "Groin hemorrhage is the most common type of junctional bleeding where regular tourniquets cannot work." Kelly JF, et al. *J Trauma*. 2008; 64(suppl 2) 89	**Junctional Hemorrhage** "Groin hemorrhage is the most common type of junctional bleeding where regular tourniquets cannot work." Kelly JF, et al. *J Trauma*. 2008; 64(suppl 2)	Groin injury is the most common type of junctional injury. Fortunately, there is a way to address hemorrhage from groin injuries.
Wounds that May Result in Junctional Hemorrhage  Typically caused by dismounted IED attacks 90	**Wounds that May Result in Junctional Hemorrhage** **Typically caused by dismounted IED attacks**	These are examples of types of wounds that may result in junctional hemorrhage.
Combat Ready Clamp™  91	**Combat Ready Clamp™**	The CRoC is a CoTCCC-recommended device for control of junctional hemorrhage in the inguinal area.

	**Combat Ready Clamp™** •Medic/Corpsman carried device •Aidbag-based –Partially broken-down –1.5 lbs	The CRoC is a light-weight, simple, mechanical device that can be carried in the medic's aid bag.
	**Assembly of the CRoC**	To assemble the CRoC, first extend the vertical arm upward until the base plate locking pin engages. Then lift the horizontal arm locking pin and insert the horizontal arm into the vertical arm receiver. Next you insert the pressure handle threaded rod through the receiver, and rotate clockwise until threaded portion is exposed. Then place the pressure disc on the end of the pressure handle rod by firmly pressing it on until it clicks into place.
	**FDA-Approved CRoC Application Points** **•The Combat Ready Clamp is indicated for use on the battlefield to control difficult bleeds in the inguinal area.** **(FDA approved indication)** **•Note: The CRoC should NOT be applied above the inguinal ligament.** **•There are two modes of use for the CRoC:** **–Direct pressure: Use directly on the site of external hemorrhage for bleeding sites below the inguinal ligament** **–Proximal Pressure: Use at or just below the inguinal ligament to compress the external iliac/femoral artery**	The CRoC is not approved by the FDA at this time for application higher in the abdomen, in the axillary region, or at the neck.

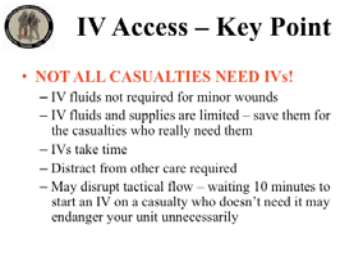
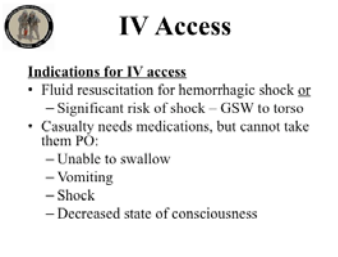
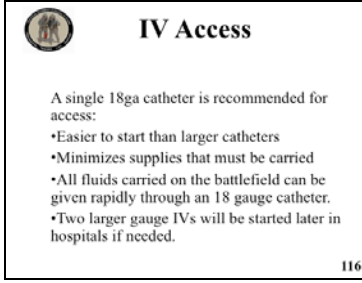
	**Superficial Anatomy of the Groin**	
	**Anatomy of the Inguinal Region**	Effective application of the CRoC depends upon accurate location. Note that the external iliac artery becomes the femoral artery as it passes under the inguinal ligament.
	**Vascular Anatomy of the Abdomen and Groin**	
	**Anatomy of the Iliac Arteries**	

CRoC Application: Direct Pressure Method  • Position the base plate under the casualty beneath the desired pressure point. • Ensure the vertical arm is in contact with the casualty on the wound side in close proximity to the wound location. 99	**CRoC Application: Direct Pressure Method** •Position the base plate under the casualty beneath the desired pressure point. •Ensure the vertical arm is in contact with the casualty on the wound side in close proximity to the wound location.	
CRoC Application: Direct Pressure Method  • Adjust the horizontal arm to position the disc head directly on the location of the most severe bleeding. 100	**CRoC Application: Direct Pressure Method** •Adjust the horizontal arm to position the disc head directly on the location of the most severe bleeding.	This slide assumes that Combat Gauze™ has been used, if available, and has been left in the wound.
CRoC Application: Direct Pressure Method  • Adjust the vertical arm downward to ensure the disc head contacts the casualty directly on the location of the most severe bleeding. 101	**CRoC Application: Direct Pressure Method** •Adjust the vertical arm downward to ensure the disc head contacts the casualty directly on the location of the most severe bleeding.	
CRoC Application: Direct Pressure Method  • Apply increasing pressure to the most severe bleeding point by turning the "T" handle clockwise. • Continue increasing the pressure until the bleeding stops. 102	**CRoC Application: Direct Pressure Method** **•Apply increasing pressure to the most severe bleeding point by turning the "T" handle clockwise.** **•Continue increasing the pressure until the bleeding stops.**	

CRoC Application: Direct Pressure Method  • Attach securing strap. 103	**CRoC Application: Direct Pressure Method** **•Attach securing strap.**	
CRoC Application: Direct Pressure Method  • Write the time of application on the label. • Note time of application on TCCC card. 104	**CRoC Application: Direct Pressure Method** **•Write the time of application on the label.** **•Note time of application on TCCC card.**	
CRoC Application: Proximal Pressure Method  105	**CRoC Application: Proximal Pressure Method**	
CRoC Application: Proximal Pressure Method  • Locate the pubic tubercle. • Locate the anterior superior iliac spine (ASIS). • Between these points is the inguinal fold. Find the mid-point of the line halfway between these two landmarks. 106	**CRoC Application: Proximal Pressure Method** **•Locate the pubic tubercle.** **•Locate the anterior superior iliac spine (ASIS).** **•Between these points is the inguinal fold. Find the mid-point of the line halfway between these two landmarks.**	This is how you find the your target pressure point - the midpoint of the inguinal ligament - when applying the CRoC using the proximal pressure method. Make sure you can feel the femoral artery pulse before placing the disc head. If you place the device right on the inguinal ligament, it may impinge on the pelvis/abdomen.

CRoC Application: Proximal Pressure Method  • Place the disc head of the CRoC just medial and distal to this midpoint (over the femoral pulse). • Tighten as previously directed. • Ensure that the bleeding has stopped. 107	**CRoC Application: Proximal Pressure Method** **•Place the disc head of the CRoC just medial and distal to this midpoint (over the femoral pulse).** **•Tighten as previously directed.** **•Ensure that the bleeding has stopped.**	
CRoC Application: Proximal Pressure Method  • Write the time of application on the label. • Note time of application on the TCCC card. 108	**CRoC Application: Proximal Pressure Method** **•Write the time of application on the label.** **•Note time of application on the TCCC card.**	
Litter Positioning of Casualty with CRoC Applied To get the casualty on a litter: • Roll the casualty onto the side opposite the CRoC. • Position the litter behind the casualty. • Roll or lift casualty onto litter. Note: • Ensure that the CRoC does not create additional discomfort for the casualty via his body weight pressing on the device. • Casualty should be transported on the unaffected side or with padding under the casualty and around the CRoC to create a space between the CRoC and the litter. 109	**Litter Positioning of Casualty with CRoC Applied** <u>To get the casualty on a litter:</u> • Roll the casualty onto the side opposite the CRoC. • Position the litter behind the casualty. • Roll or lift casualty onto litter. <u>Note:</u> • Ensure that the CRoC does not create additional discomfort for the casualty via his body weight pressing on the device. • Casualty should be transported on the unaffected side or with padding under the casualty and around the CRoC to create a space between the CRoC and the litter.	Care should be taken when moving the casualty in order to avoid loosening or displacement of disc head from the desired pressure point. Continued hemorrhage control should be assessed when the casualty is placed on the litter, and after each movement of the litter.

CRoC Properly Applied  110	**CRoC Properly Applied**	These photos show the CRoC properly applied and the casualty properly positioned on the litter. Note in the photo on the left that the casualty is rotated onto his right side so that the CRoC applied on his left side is not in contact with the litter. In the right-hand photo, the casualty is positioned on his back, and padding has been used under the casualty to prevent contact between the CRoC and the litter. In both photos, the CRoC has been applied so that its vertical arm is in direct contact with the casualty's left side.
CRoC Improperly Applied  111	**CRoC Improperly Applied**	In the photo on the left, the casualty is rotated onto his right side so the CRoC does not contact the litter, but what is wrong here? The CRoC has been applied so its vertical arm is not touching the casualty's side. It can be easily knocked out of position during transport. What's wrong in the photo on the right? The CRoC is in direct contact with the litter.
Continued Reassessment! • Once applied, the CRoC, as well as the casualty's other hemorrhage control interventions, must be frequently reassessed to assure continued hemorrhage control. –DO NOT EVER APPLY IT AND FORGET IT! 112	**Continued Reassessment!** •Once applied, the CRoC, as well as the casualty's other hemorrhage control interventions, must be frequently reassessed to assure continued hemorrhage control. **–DO NOT EVER APPLY IT AND FORGET IT!**	
Tactical Field Care Guidelines 5. Intravenous (IV) access • Start an 18-gauge IV or saline lock if indicated. • If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route. 113	**Tactical Field Care Guidelines** **5. Intravenous (IV) access** **•Start an 18-gauge IV or saline lock if indicated.** **•If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route.**	

	**IV Access – Key Point** **•NOT ALL CASUALTIES NEED IVs!** –IV fluids not required for minor wounds –IV fluids and supplies are limited – save them for the casualties who really need them –IVs take time –Distract from other care required –May disrupt tactical flow – waiting 10 minutes to start an IV on a casualty who doesn't need it may endanger your unit unnecessarily	DO NOT start IVs on casualties who are unlikely to need fluid resuscitation for shock or IV medications. The alleged need to start two large-bore IVs on every casualty is a medical "urban myth." That concept is outdated on the modern battlefield. Combat leaders need to know this fact.
	**IV Access** **Indications for IV access** •Fluid resuscitation for hemorrhagic shock or –Significant risk of shock – GSW to torso •Casualty needs medications, but cannot take them PO: –Unable to swallow –Vomiting –Shock –Decreased state of consciousness	Here are the casualties who really need IVs. Casualties with a gunshot wound to the torso may not be in shock at first, BUT they may continue to bleed internally and go into shock later.
	**IV Access** A single 18ga catheter is recommended for access: •Easier to start than larger catheters •Minimizes supplies that must be carried •All fluids carried on the battlefield can be given rapidly through an 18 gauge catheter. •Two larger gauge IVs will be started later in hospitals if needed.	You do not need a 14 gauge IV in the field – they are harder to start.

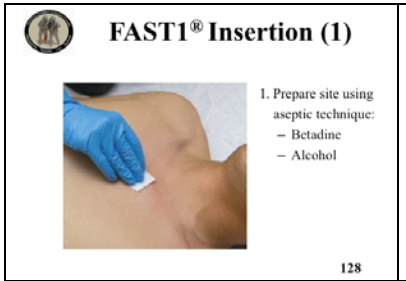
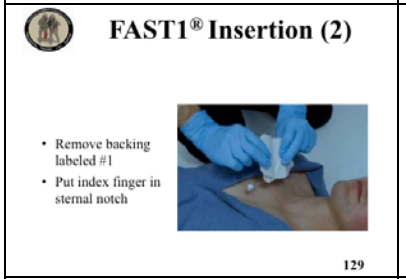
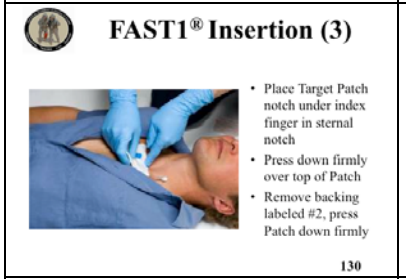
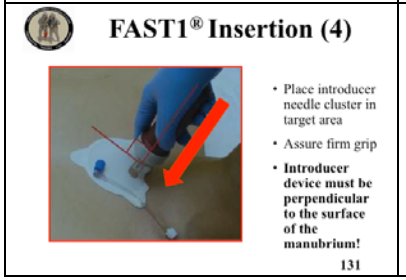
IV Access – Key Points • Don't insert an IV distal to a significant wound! • A saline lock is recommended instead of an IV line unless fluids are needed immediately. – Much easier to move casualty without the IV line and bag attached – Less chance of traumatic disinsertion of IV – Provides rapid subsequent access if needed – Conserve IV fluids • Flush saline lock with 5cc NS immediately and then every 1-2 hours to keep it open 117	**IV Access – Key Points** •Don't insert an IV distal to a significant wound! •A saline lock is recommended instead of an IV line unless fluids are needed immediately. –Much easier to move casualty without the IV line and bag attached –Less chance of traumatic disinsertion of IV –Provides rapid subsequent access if needed –Conserve IV fluids •Flush saline lock with 5cc NS immediately and then every 1-2 hours to keep it open	Don't hang fluids unless the casualty really needs them.
Rugged Field IV Setup (1) **Start a Saline Lock and Cover with Tegoderm® or Equivalent**  118	**Rugged Field IV Setup (1)** **Start a Saline Lock and Cover with Tegoderm® or Equivalent**	Here's is an excellent way to ruggedize an IV developed by the Army Rangers.
Rugged Field IV Setup (2) **Flush Saline Lock with 5 cc of IV Fluid**  Saline lock must be flushed immediately (within 2-3 minutes), and then flushed every 2 hours if IV fluid is not running. 119	**Rugged Field IV Setup (2)** **Flush Saline Lock with 5 cc of IV Fluid** **Saline lock must be flushed immediately (within 2-3 minutes), and then flushed every 2 hours if IV fluid is not running.**	Don't forget to flush the saline lock! It will clot off if you don't.
Rugged Field IV Setup (3) **Insert Second Needle/Catheter and Connect IV**  120	**Rugged Field IV Setup (3)** **Insert Second Needle/Catheter and Connect IV**	Insert 2nd catheter right through Tegaderm. Insert IV line after flushing with fluid to get the air out of the line.

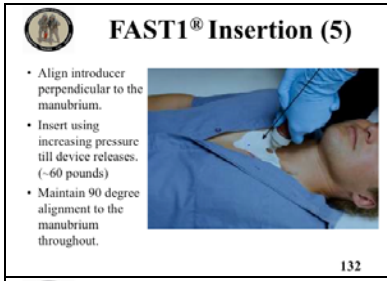
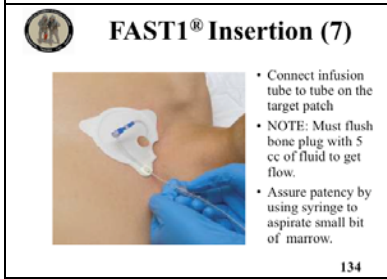
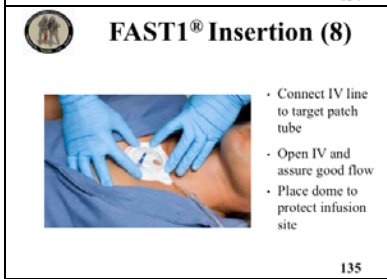
Rugged Field IV Setup (4) Secure IV Line with Velcro Strap  121	**Rugged Field IV Setup (4)** **Secure IV Line with Velcro Strap**	Velcro strap helps prevent traumatic disinsertion of IV line.
Rugged Field IV Setup (5) Remove IV as Needed for Transport  122	**Rugged Field IV Setup (5)** **Remove IV as Needed for Transport**	Even if the IV line is pulled out, the saline lock will remain in place. This ruggedized IV technique has worked very well on the battlefield.
 	**Questions?**	
Intraosseous (IO) Access   If unable to start an IV and fluids or meds are needed urgently, insert a sternal I/O line to provide fluids. 124	**Intraosseous (IO) Access** **If unable to start an IV and fluids or meds are needed urgently, insert a sternal I/O line to provide fluids.**	The current IO device in most military medical sets is the Pyng FAST1®. The FAST1® was selected due to concerns about multiple extremity trauma precluding adequate site selection for extremity IV devices. Body armor use also generally protects the sternal insertion site. Hand out the FAST1® device. You'll go through the contents on the next slide.

FAST1® IO Device  125	**FAST1® IO Device** 	Go through the various components of the FAST1® as shown.

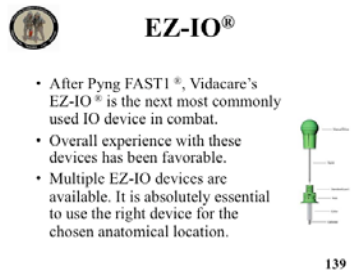
FAST1® Warnings
FAST1® NOT RECOMMENDED IF:
• Patient is of small stature:
  • Weight of less than 50 kg (110 pounds)
  • Less than 12 years old
• Fractured manubrium/sternum – flail chest
• Significant tissue damage at site – trauma, infection
• Severe osteoporosis
• Previous sternotomy and/or scar
• NOTE: FAST1® INFUSION TUBE SHOULD NOT BE LEFT IN PLACE FOR MORE THAN 24 HOURS
126
	FAST1® Warnings
	FAST1® NOT RECOMMENDED IF:
	• Patient is of small stature:
	  • Weight of less than 50 kg (110 pounds)
	  • Less than 12 years old
	• Fractured manubrium/sternum – flail chest
	• Significant tissue damage at site – trauma, infection
	• Severe osteoporosis
	• Previous sternotomy and/or scar
	• **NOTE: FAST1® INFUSION TUBE SHOULD NOT BE LEFT IN PLACE FOR MORE THAN 24 HOURS**
		A few things to be aware of about the FAST1®.

FAST1® Flow Rates • 30-80 ml/min by gravity • 120 ml/min utilizing pressure infusion • 250 ml/min using syringe forced infusion 127	**FAST1® Flow Rates** • **30-80 ml/min by gravity** • **120 ml/min utilizing pressure infusion** • **250 ml/min using syringe forced infusion**	How fast do fluids flow through the FAST1®? Note that IO space connects directly with the intravenous space. Use pressure to force in the Hextend fluid bolus, for instance, that we will discuss later.

	**FAST1® Insertion (1)** 1.Prepare site using aseptic technique: –Betadine –Alcohol	Show them where the suprasternal notch is on yourself. It is important to sterilize the site before inserting the IO device. Introduction of bacteria from dirty skin into the medullary cavity of the sternum can lead to infection inside the bone (osteomyelitis). This is a particularly undesirable complication because treatment may require removal of the sternum with resultant loss of the very important protection it provides for the heart.
	**FAST1® Insertion (2)** •Remove backing labeled #1 •Put index finger in sternal notch	The Target Patch has a two-piece peel-off backing.
	**FAST1® Insertion (3)** •Place Target Patch notch under index finger in sternal notch •Press down firmly over top of Patch •Remove backing labeled #2, press Patch down firmly	Recheck position of notch and apply target patch.
	**FAST1® Insertion (4)** •Place introducer needle cluster in target area •Assure firm grip •**Introducer device must be perpendicular to the surface of the manubrium!**	The manubrium is the top part of the sternum – this is where infuser will go. Introducer MUST be perpendicular to the manubrium, or it won't work.

	**FAST1® Insertion (5)** •Align introducer perpendicular to the manubrium. •Insert using increasing pressure till device releases. (~60 pounds) •Maintain 90-degree alignment to the manubrium throughout.	Slow, steady pressure….
	**FAST1® Insertion (6)** •Following device release, infusion tube separates from introducer •Remove introducer by pulling straight back •Cap introducer using post-use sharps plug and cap supplied	Careful with sharp introducer when done.
	**FAST1® Insertion (7)** •Connect infusion tube to tube on the target patch •NOTE: Must flush bone plug with 5 cc of fluid to get flow. •Assure patency by using syringe to aspirate small bit of marrow.	KEY POINT – MUST FLUSH BONE PLUG WITH 5cc of IV fluid run through the infuser. Use more if needed.
	**FAST1® Insertion (8)** •Connect IV line to target patch tube •Open IV and assure good flow •Place dome to protect infusion site	Run fluid through IV line before connecting to remove air from line.

 **FAST1® Insertion (9)** Potential Problems: • Infiltration – Usually due to insertion not perpendicular to sternum • Inadequate flow or no flow – Infusion tube occluded with bone plug – Use additional saline flush to clear the bone plug 136	**FAST1® Insertion (9)** Potential Problems: •Infiltration –Usually due to insertion not perpendicular to sternum •Inadequate flow or no flow –Infusion tube occluded with bone plug –Use additional saline flush to clear the bone plug	What are some of the things that can go wrong when you are inserting the FAST1®?
 **FAST1® Access – Key Points** • DO NOT insert the FAST1® on volunteers as part of training – use the training device provided. • Should not have to remove in the field – it can be removed at the medical treatment facility. 137	**FAST1® Access – Key Points** **•DO NOT insert the FAST1® on volunteers as part of training – use the training device provided.** **•Should not have to remove in the field – it can be removed at the medical treatment facility.**	More key things to know about the FAST1®. A slide describing the removal process is in the back-up slides for this presentation.
 **FAST1® Insertion Video**  Key Point Not Shown in Video • Remember to run IV fluids through the IV line before connecting. 138	**FAST1® Insertion Video** **Key Point Not Shown in Video** •Remember to run IV fluids through the IV line before connecting.	Read the additional key point.

	**EZ-IO®** •After Pyng FAST1 ®, Vidacare's EZ-IO ® is the next most commonly used IO device in combat. •Overall experience with these devices has been favorable. •Multiple EZ-IO devices are available. It is absolutely essential to use the right device for the chosen anatomical location.	The device made for sternal insertion has a green plastic hub and 7.5mm-long needle. The EZ-IO device made for long bone insertion (humerus, tibia) has a blue hub and its needle is 25mm long. There are also pediatric and large patient devices. The packaging for these devices is markedly different. The long bone device package is marked "NOT FOR STERNAL USE." Intraosseous needles designed for long bone insertion have the potential to perforate the sternum, a thinner and less dense bone. In this situation, IV fluids may be introduced into the mediastinum. MAKE SURE YOU USE THE CORRECT DEVICE FOR THE SITE CHOSEN! (NOTE TO INSTRUCTORS): Slides showing the procedure for placement of the EZ-IO sternal device are appended to the end of this presentation.)
	Questions? IV/IO Practical	IV Practical Skill Sheet IO Practical Skill Sheet

 **Tranexamic Acid (TXA)** 6. Tranexamic Acid (TXA) If a casualty is anticipated to need significant blood transfusion (for example: presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding) – Administer 1 gram of tranexamic acid (TXA) in 100 cc Normal Saline or Lactated Ringer's as soon as possible but NOT later than 3 hours after injury. – Begin second infusion of 1 gm TXA after Hextend or other fluid treatment. * Note: Per the Assistant Secretary of Defense for Health Affairs memo dated 4 November 2011, use of TXA outside of fixed medical facilities is limited to the Special Operations community. 141	**Tranexamic Acid (TXA)** **6. Tranexamic Acid (TXA)** **If a casualty is anticipated to need significant blood transfusion (for example: presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding)** **–Administer 1 gram of tranexamic acid (TXA) in 100 cc Normal Saline or Lactated Ringer's as soon as possible but NOT later than 3 hours after injury.** **–Begin second infusion of 1 gm TXA after Hextend or other fluid treatment.** *** Note: Per the Assistant Secretary of Defense for Health Affairs memo dated 4 November 2011, use of TXA outside of fixed medical facilities is limited to the Special Operations community.**	
 **TXA** • Hemorrhage is the leading cause of preventable death on the battlefield • Tourniquets and Combat Gauze do not work for *internal* bleeding • TXA does! 142	**TXA** **•Hemorrhage is the leading cause of preventable death on the battlefield** **•Tourniquets and Combat Gauze do not work for *internal* bleeding** **•TXA does!**	TXA is the medic's best tool for stopping internal bleeding!
 **TXA** • TXA does not promote new clot formation • Prevents forming clots from being broken down by the body • Helps stop the bleeding • Helps prevent death from hemorrhage • Two major studies have shown a survival benefit from TXA, especially in casualties that require a massive transfusion of blood products 143	**TXA** **•TXA does not promote new clot formation** **•Prevents forming clots from being broken down by the body** **•Helps stop the bleeding** **•Helps prevent death from hemorrhage** **•Two major studies have shown a survival benefit from TXA, especially in casualties that require a massive transfusion of blood products**	CRASH-2: a very large (20,000 plus) patients in civilian trauma patients MATTERS (Military Application of Tranexamic Acid in Traumatic Emergency and Resuscitative Surgery) – 896 casualties treated at the Bastion hospital in Afghanistan Both studies showed a significant decrease in mortality with TXA use

 **TXA** • Survival benefit GREATEST when given within 1 hour of injury • Survival benefit still present when given within 3 hours of injury • DO NOT GIVE TXA if more than 3 hours have passed since the casualty was injured – survival is DECREASED by TXA given after this point • *DON'T DELAY WITH TXA!* 144	**TXA** **•Survival benefit GREATEST when given within 1 hour of injury** **•Survival benefit still present when given within 3 hours of injury** **•DO NOT GIVE TXA if more than 3 hours have passed since the casualty was injured – survival is DECREASED by TXA given after this point** ***•DON'T DELAY WITH TXA!***	It is just common sense if you are trying to stop bleeding to do that AS SOON AS POSSIBLE. We do not have a good reason why TXA should cause casualties to do worse after 3 hours. REINFORCE THAT BLEEDING SHOULD BE STOPPED ASAP – GIVE TXA WTHOUT DELAY!
 **TXA** • Trade name: Cyklokapron® • FDA-approved • Possible side effects: – Nausea, vomiting, diarrhea – Visual disturbances – Possible increase in risk of post-injury blood clots – Hypotension if given as IV bolus 145	**TXA** **•Trade name: Cyklokapron®** **•FDA-approved** **•Possible side effects:** **–Nausea, vomiting, diarrhea** **–Visual disturbances** **–Possible increase in risk of post-injury blood clots** **–Hypotension if given as IV bolus**	Do not be deterred by possible side effects The important thing is to stop the bleeding and save the life of the casualty.
 **TXA** **Storage and Handling** • Recommended temperature range for storage: 59°-86° F • Must protect this drug from environmental extremes • Store and transport in air conditioned spaces • On missions, carry in small insulated container • In very cold temperatures, carrying TXA next to the body on missions will protect from cold • Carriage in aid bag also acts as insulator against temperature extremes • Return to room temperature storage after each mission 146	**TXA Storage and Handling** **•Recommended temperature range for storage: 59°-86° F** **•Must protect this drug from environmental extremes** **•<u>Store and transport in air conditioned spaces</u>** **•On missions, carry in small insulated container** **•In very cold temperatures, carrying TXA next to the body on missions will protect from cold** **•Carriage in aid bag also acts as insulator against temperature extremes** **•Return to room temperature storage after each mission**	

TXA Administration – 1st Dose • Supplied in 1 gram (1000 mg) ampoules • Should NOT be given with Hextend or through an IV line with Hextend in it • Inject 1 gram of TXA into a 100-cc bag of normal saline or lactated ringer's • Infuse slowly over 10 minutes • Rapid IV push may cause hypotension • If there is a new-onset drop in BP during the infusion – SLOW DOWN the TXA infusion • Then administer blood products or Hextend 147	**TXA** **Administration – 1st Dose** **•Supplied in 1 gram (1000 mg) ampoules** **•Should NOT be given with Hextend or through an IV line with Hextend in it** **•Inject 1 gram of TXA into a 100-cc bag of normal saline or lactated ringer's** **•Infuse slowly over 10 minutes** **•Rapid IV push may cause hypotension** **•If there is a new-onset drop in BP during the infusion – SLOW DOWN the TXA infusion** **•Then administer blood products or Hextend**	
TXA Administration – 2nd Dose • Typically given after the casualty arrives at a RoleII/Role III medical facility • May be given in field if evacuation is delayed and fluid resuscitation has been completed before arrival at the medical facility • If still in field or in TACEVAC when fluid resuscitation is complete, give second dose of TXA as directed for the first dose 148	**TXA** **Administration – 2nd Dose** **•Typically given after the casualty arrives at a Role II/Role III medical facility** **•May be given in field if evacuation is delayed and fluid resuscitation has been completed before arrival at the medical facility** **•If still in field or in TACEVAC when fluid resuscitation is complete, give second dose of TXA as directed for the first dose**	
Questions?  149	**Questions?**	

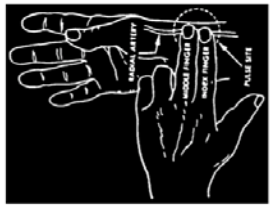
 Tactical Field Care Guidelines 7. Fluid Resuscitation • Assess for hemorrhagic shock; altered mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock. a. If not in shock: - No IV fluids necessary - PO fluids permissible if conscious and can swallow 150	**Tactical Field Care Guidelines** **7. Fluid Resuscitation** **•Assess for hemorrhagic shock; altered mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock.** **a. If not in shock:** **- No IV fluids necessary** **- PO fluids permissible if conscious and can swallow**	Read text
 Tactical Field Care Guidelines 7. Fluid Resuscitation b. If in shock: - Hextend, 500ml IV bolus - Repeat once after 30 minutes if still in shock - No more than 1000ml of Hextend 151	**Tactical Field Care Guidelines** **7. Fluid Resuscitation** **b. If in shock:** **- Hextend, 500ml IV bolus** **- Repeat once after 30 minutes if still in shock** **- No more than 1000ml of Hextend**	Read text
 Tactical Field Care Guidelines 7. Fluid Resuscitation c. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties. 152	**Tactical Field Care Guidelines** **7. Fluid Resuscitation** **c. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties.**	Read text
 Tactical Field Care Guidelines 7. Fluid Resuscitation d. If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse. 153	**Tactical Field Care Guidelines** **7. Fluid Resuscitation** **d. If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse.**	Read text

Blood Loss and Shock What is "Shock?" • Inadequate blood flow to the body tissues • Leads to inadequate oxygen delivery and cellular dysfunction • May cause death • Shock can have many causes, but on the battlefield, it is typically caused by severe blood loss 154	**Blood Loss and Shock** **What is "Shock?"** **•Inadequate blood flow to the body tissues** **•Leads to inadequate oxygen delivery and cellular dysfunction** **•May cause death** **•Shock can have many causes, but on the battlefield, it is typically caused by severe blood loss**	A lot of people talk about "shock" without really understanding what it is.
Blood Loss and Shock Question: How does your body react to blood loss? Answer: It depends – on how much blood you lose. 155	**Blood Loss and Shock** **Question: How does your body react to blood loss?** **Answer: It depends – on how much blood you lose.**	Let's talk about blood loss and what happens when that occurs.
Normal Adult Blood Volume **5 Liters**  156	**Normal Adult Blood Volume** **5 Liters**	For demonstration – this slide shows 5 liters of simulated blood. Shown in five 1-liter bottles to help with the demo.
500cc Blood Loss 4.5 Liters Blood Volume  157	**500cc Blood Loss** **4.5 Liters Blood Volume**	So – here we have lost the first 500cc of blood. This is what you lose when you donate a "pint" or a unit of blood at the blood bank.

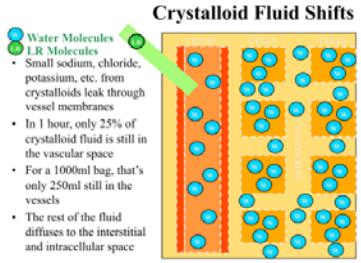
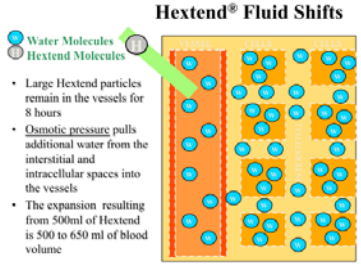
500cc Blood Loss • Mental State: Alert • Radial Pulse: Full • Heart Rate: Normal or slightly increased • Systolic Blood pressure: Normal • Respiratory Rate: Normal • Is the casualty going to die from this? No 158	**500cc Blood Loss** **•Mental State: Alert** **•Radial Pulse: Full** **•Heart Rate: Normal or slightly increased** **•Systolic Blood pressure: Normal** **•Respiratory Rate: Normal** **•Is the casualty going to die from this?** **No**	No danger from this level of blood loss. Keep in mind that factors such as exertion, fear, and pain may affect heart rate and breathing rate, and these factors will affect anyone engaged in combat, especially someone who has been wounded. You have to consider these things when treating casualties on the battlefield. For this demonstration, though, we are ignoring these factors, so the physiologic changes you see here are due solely to blood loss.
1000cc Blood Loss **4.0 Liters Blood Volume**  159	**1000cc Blood Loss** **4.0 Liters Blood Volume**	So now we lose another 500cc of blood. How are we doing now?

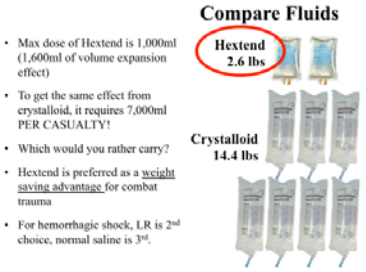
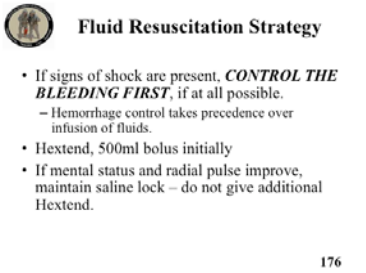
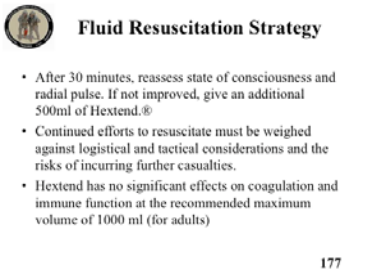
1000cc Blood Loss • Mental State: Alert • Radial Pulse: Full • Heart Rate: 100 + • Systolic Blood pressure: Normal lying down • Respiratory Rate: May be normal • Is the casualty going to die from this? No 160	**1000cc Blood Loss** •Mental State: Alert •Radial Pulse: Full •Heart Rate: 100 + •Systolic Blood pressure: Normal lying down •Respiratory Rate: May be normal •Is the casualty going to die from this? **No**	Still basically OK. Heart rate may be up a little.
1500cc Blood Loss **3.5 Liters Blood Volume**  161	**1500cc Blood Loss**	Lose another 500cc of blood. How are we doing now?

1500cc Blood Loss • Mental State: Alert but anxious • Radial Pulse: May be weak • Heart Rate: 100+ • Systolic Blood pressure: May be decreased • Respiratory Rate: 30 • Is the casualty going to die from this? Probably not 162	**1500cc Blood Loss** •Mental State: Alert but anxious •Radial Pulse: May be weak •Heart Rate: 100+ •Systolic Blood pressure: May be decreased •Respiratory Rate: 30 •Is the casualty going to die from this? Probably not	At this point, the casualty is showing some symptoms from his blood loss. Would probably not die from this.
2000cc Blood Loss 3.0 Liters Blood Volume  163	**2000cc Blood Loss** **3.0 Liters Blood Volume**	Lose another 500cc of blood. On the battlefield, this would represent ongoing uncontrolled hemorrhage. How is the casualty doing now?
2000cc Blood Loss • Mental State: Confused/lethargic • Radial Pulse: Weak • Heart Rate: 120 + • Systolic Blood pressure: Decreased • Respiratory Rate: >35 • Is the casualty going to die from this? Maybe 164	**2000cc Blood Loss** •Mental State: Confused/lethargic •Radial Pulse: Weak •Heart Rate: 120 + •Systolic Blood pressure: Decreased •Respiratory Rate: >35 •Is the casualty going to die from this? **Maybe**	Not so good. At this point, it is quite possible that he or she could die from the blood loss. This is “hemorrhagic” or “hypovolemic” (meaning “not enough blood volume”) shock.
2500cc Blood Loss 2.5 Liters Blood Volume  165	**2500cc Blood Loss** **2.5 Liters Blood Volume**	So let’s take away another 500cc of blood from our simulated casualty. Casualty is now in big trouble.

2500cc Blood Loss • Mental State: Unconscious • Radial Pulse: Absent • Heart Rate: 140+ • Systolic Blood pressure: Markedly decreased • Respiratory Rate: Over 35 • Is he going to die from this? Probably 166	**2500cc Blood Loss** •Mental State: Unconscious •Radial Pulse: Absent •Heart Rate: 140+ •Systolic Blood pressure: Markedly decreased •Respiratory Rate: Over 35 •Is he going to die from this? **Probably**	At this point – the casualty has lost HALF of the blood in his/her body. This level of hemorrhage is likely to be fatal. YOUR JOB IS NOT TO LET THEM LOSE THIS MUCH BLOOD! Treating the blood loss after the fact is not as good an option.
Recognition of Shock on the Battlefield • Combat medical personnel need a fast, reliable, low-tech way to recognize shock on the battlefield. • The best TACTICAL indicators of shock are: – Decreased state of consciousness (if casualty has not suffered TBI) and/or – Abnormal character of the radial pulse (weak or absent) 167	**Recognition of Shock on the Battlefield** •Combat medical personnel need a fast, reliable, low-tech way to recognize shock on the battlefield. **•The best TACTICAL indicators of shock are:** **–Decreased state of consciousness (if casualty has not suffered TBI) and/or** **–Abnormal character of the radial pulse (weak or absent)**	These are the signs you can reliably identify on the battlefield or in a noisy CASEVAC environment. Note that identification of these signs requires neither stethoscope nor sphygmomanometer. Medications can also cause an altered state of consciousness (e.g. - if you give too much narcotics).
Palpating for the Radial Pulse  168	**Palpating for the Radial Pulse**	Here's how you find the radial pulse. Demonstrate and have the class do it on themselves. Get confirmation from everyone in the class that they were able to feel their own radial pulse. Everyone take a few moments to appreciate how a normal pulse feels – strong, slow, regular. **Anybody here NOT have a strong, slow, regular pulse???**
Fluid Resuscitation Strategy If the casualty is not in shock: – No IV fluids necessary – SAVE IV FLUIDS FOR CASUALTIES WHO REALLY NEED THEM. – PO fluids permissible if casualty can swallow • Helps treat or prevent dehydration • OK, even if wounded in abdomen – Aspiration is extremely rare; low risk in light of benefit – Dehydration increases mortality 	**Fluid Resuscitation Strategy** **If the casualty is not in shock:** **–No IV fluids necessary – SAVE IV FLUIDS FOR CASUALTIES WHO REALLY NEED THEM.** –PO fluids permissible if casualty can swallow •Helps treat or prevent dehydration •OK, even if wounded in abdomen –Aspiration is extremely rare; low risk in light of benefit –Dehydration increases mortality	Don't ever use your IV fluids unless the casualty needs them. The next person to get shot may die if he or she doesn't get them. CONSERVE precious medical supplies on the battlefield.

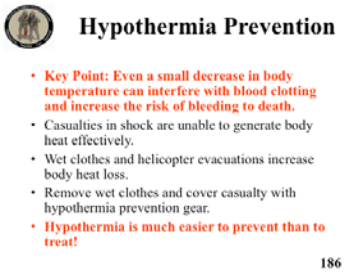
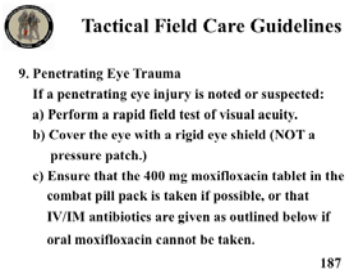
 **Hypotensive Resuscitation** **Goals of Fluid Resuscitation Therapy** • Improved state of consciousness (if no TBI) • Palpable radial pulse corresponds roughly to systolic blood pressure of 80 mm Hg • Avoid over-resuscitation of shock from torso wounds. • **Too much fluid volume may make internal hemorrhage worse by "Popping the Clot."** 170	**Hypotensive Resuscitation** **Goals of Fluid Resuscitation Therapy** •Improved state of consciousness (if no TBI) •Palpable radial pulse corresponds roughly to systolic blood pressure of 80 mm Hg •Avoid over-resuscitation of shock from torso wounds. **•Too much fluid volume may make internal hemorrhage worse by "Popping the Clot."**	DO NOT try to restore a normal blood pressure. As you infuse fluid, the blood pressure goes up. If it goes up too much, this may interfere with your body's attempt to clot off an internal bleeding site both by diluting clotting factors and increasing the pressure to the point where the clot is disrupted by the hydrostatic force exerted by the IV fluid. Bickell study in New England Journal of Medicine 1994: Patients with shock from uncontrolled hemorrhage did WORSE with aggressive prehospital fluids
 **Choice of Resuscitation Fluid in the Tactical Environment** • Why use Hextend instead of the much less expensive Ringer's Lactate used in civilian trauma? • 1000ml of Ringers Lactate (2.4 pounds) will yield an expansion of the circulating blood volume of only about 200ml one hour after the fluid is given. • **The other 800ml of RL has left the circulation after an hour and entered other fluid spaces in the body – FLUID THAT HAS LEFT THE CIRCULATION DOES NOT HELP TREAT SHOCK AND MAY CAUSE OTHER PROBLEMS.** 171	**Choice of Resuscitation Fluid in the Tactical Environment** •Why use Hextend instead of the much less expensive Ringer's Lactate used in civilian trauma? •1000ml of Ringers Lactate (2.4 pounds) will yield an expansion of the circulating blood volume of only about 200ml one hour after the fluid is given. **•The other 800ml of RL has left the circulation after an hour and entered other fluid spaces in the body – FLUID THAT HAS LEFT THE CIRCULATION DOES NOT HELP TREAT SHOCK AND MAY CAUSE OTHER PROBLEMS.**	Lactated Ringer's solution and normal saline cost less than a dollar for a 1000cc bag. Hextend costs more than $100 for the same amount. Why pay this extra money? **BECAUSE HEXTEND WORKS BETTER FOR COMBAT CASUALTIES WHOSE EVACUATION MAY BE DELAYED.** **The increase in circulating blood volume lasts much longer with Hextend than with NS or Lactated Ringers.** **"Other problems" noted above include shock lung, cerebral edema, and abdominal compartment syndrome. All of these may cause late deaths in casualties.**
 **Choice of Resuscitation Fluid** • 500ml of 6% hetastarch (trade name Hextend®, weighs 1.3lbs) and will yield an expansion of the intravascular volume of 600-800ml. • **This intravascular expansion is still present 8 hours later – may be critical if evacuation is delayed.** • Hextend® – Less weight to carry for equal effect – Stays where it is supposed to be longer and does the casualty more good – Less likely to cause undesirable side effects 172	**Choice of Resuscitation Fluid** •500ml of 6% hetastarch (trade name Hextend®, weighs 1.3lbs) and will yield an expansion of the intravascular volume of 600-800ml. **•This intravascular expansion is still present 8 hours later – may be critical if evacuation is delayed.** •Hextend® –Less weight to carry for equal effect –Stays where it is supposed to be longer and does the casualty more good –Less likely to cause undesirable side effects	In IV fluids, the fluid follows the molecules in it. NS and LR have salt molecules, which leave the circulation and go to the entire body. Hextend contains the very large hetastarch molecule – has more "osmotic power." What does this mean? The large size of the hetastarch molecules keeps them in the circulation, so the fluid stays there, too.

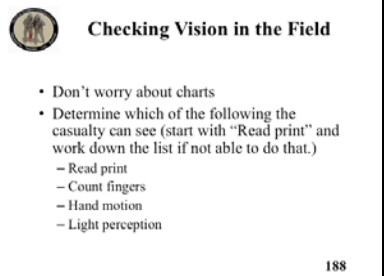
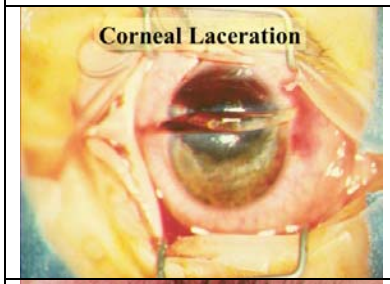
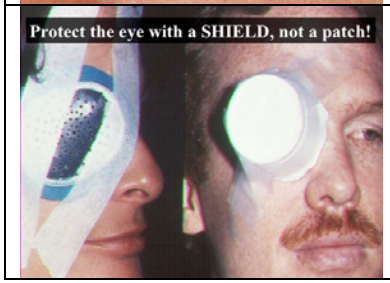
	**Crystalloid Fluid Shifts** **Water Molecules** **LR Molecules** •Small sodium, chloride, potassium, etc. from crystalloids leak through vessel membranes •In 1 hour, only 25% of crystalloid fluid is still in the vascular space •For a 1000ml bag, that's only 250ml still in the vessels •The rest of the fluid diffuses to the interstitial and intracellular space	Animated slide
	**Hextend® Fluid Shifts** **Water Molecules** **Hextend Molecules** •Large Hextend particles remain in the vessels for 8 hours •Osmotic pressure pulls additional water from the interstitial and intracellular spaces into the vessels •The expansion resulting from 500ml of Hextend is 500 to 650 ml of blood volume	This volume of fluid pulled from the interstitial and intercellular spaces is of negligible effect on these large fluid spaces. BUT, THIS EXTRA VOLUME IN THE SMALLER INTRAVASCULAR SPACE CAN BE LIFE SAVING! CASUALTIES DIE FROM BLOOD LOSS, NOT FROM DEHYDRATION! (NOTE: The average adult human body contains approximately 42L of water. 2/3 of that water is inside the cells (approximately 28L). 1/3 is inside blood vessels and in the "interstitial space" (approximately 14L). If we have an average of 5L inside blood vessels, this leaves 9 liters within the interstitial space. If a 500cc Hextend bolus were actually able to pull a full 300cc from the interstitial space into the blood vessels, that only represents about 3% of the total available fluid.)

	**Compare Fluids** •Max dose of Hextend is 1,000ml (1,600ml of volume expansion effect) •To get the same effect from crystalloid, it requires 7,000ml PER CASUALTY! •Which would you rather carry? •Hextend is preferred as a weight saving advantage for combat trauma •For hemorrhagic shock, LR is 2nd choice, normal saline is 3rd.	
	**Fluid Resuscitation Strategy** •If signs of shock are present, ***CONTROL THE BLEEDING FIRST***, if at all possible. –Hemorrhage control takes precedence over infusion of fluids. •Hextend, 500ml bolus initially •If mental status and radial pulse improve, maintain saline lock – do not give additional Hextend.	The most important part of managing shock is to PREVENT it.
	**Fluid Resuscitation Strategy** •After 30 minutes, reassess state of consciousness and radial pulse. If not improved, give an additional 500ml of Hextend.® •Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risks of incurring further casualties. •Hextend has no significant effects on coagulation and immune function at the recommended maximum volume of 1000 ml (for adults)	If the casualty improves after the first 500cc bolus and stays better, DO NOT give the additional bolus of Hextend. Doses of Hextend of 1500cc and greater may have an adverse effect on clotting.

TBI Fluid Resuscitation If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse : – Resuscitate with sufficient Hextend® to maintain a palpable radial pulse. – Shock increases mortality in casualties with head injuries. – Must give adequate IV fluids to restore adequate blood flow to brain. 178	**TBI Fluid Resuscitation** If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse: –Resuscitate with sufficient Hextend® to maintain a palpable radial pulse. –Shock increases mortality in casualties with head injuries. –Must give adequate IV fluids to restore adequate blood flow to brain.	TBI (traumatic brain injury) – can be either a closed head injury or penetrating head trauma. In this case, the need to ensure that there is enough blood pressure to pump blood to the brain means that you have to be more aggressive with your fluid resuscitation. Hextend's ability to STAY in the circulation rather than leaving it may help to prevent cerebral edema in TBI casualties.
Questions? 	**Questions?**	
Tactical Field Care Guidelines 8. Prevention of hypothermia a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible. b. Replace wet clothing with dry if possible. Get the casualty onto an insulated surface as soon as possible. c. Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS). 180	**Tactical Field Care Guidelines** **8. Prevention of hypothermia** **a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.** **b. Replace wet clothing with dry if possible. Get the casualty onto an insulated surface as soon as possible.** **c. Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS).**	Read text

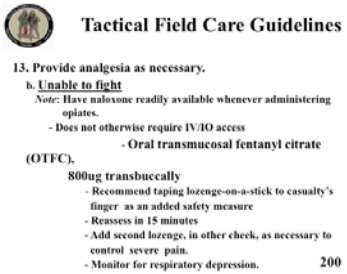
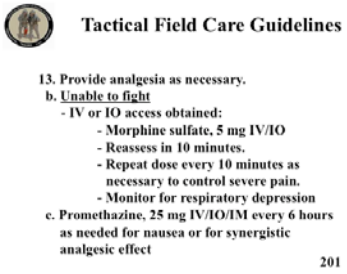
Tactical Field Care Guidelines 8. Prevention of hypothermia (cont) d. If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready Heat blanket may also be used. e. If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry. f. Warm fluids are preferred if IV fluids are required. 181	**Tactical Field Care Guidelines** **8. Prevention of hypothermia (cont)** **d. If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready Heat blanket may also be used.** **e. If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry.** **f. Warm fluids are preferred if IV fluids are required.**	Read text
THE OLD HPMK 	**THE OLD HPMK**	The old HPMK contains a Thermo-Lite Hypothermia Prevention Cap, a Ready-Heat Blanket, and a Blizzard Survival Blanket. The cap can be blown off by rotor wash when loading a casualty in a helicopter, and the Blizzard Rescue Blanket does not provide convenient exposure for tending IVs and tourniquets. Nevertheless, this is still an effective combination.
 Apply Ready Heat blanket to torso OVER shirt. 183	**6 – Cell*"Ready-Heat"* Blanket** **4- Cell *"Ready-Heat"* Blanket** Apply Ready Heat blanket to torso OVER shirt.	The Ready-Heat blanket generates heat when exposed to the air. It can produce temperatures reaching 104°F for several hours. Works for up to 8 hours. Avoid direct contact with bare skin, as thermal burns are possible. Ready-Heat blankets may not work as well at high altitudes. The lower partial pressure of oxygen at high altitudes may not be enough to sustain the chemical reaction required to generate heat.
Repeat • Do NOT place the ready-Heat Blanket directly on the skin • Multiple reports of skin burns from this being done • Keep cammie top or T-shirt on • Place Ready-Heat over the fabric 184	**Repeat** • Do **NOT** place the ready-Heat Blanket directly on the skin • Multiple reports of skin burns from this being done • Keep cammie top or T-shirt on • Place Ready-Heat over the fabric	

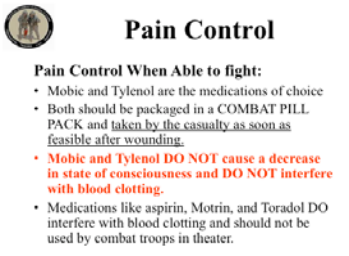
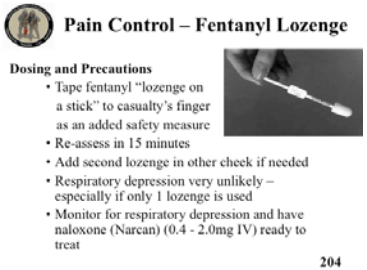
	**NEW HPMK**	This is the new Hypothermia Prevention and Management Kit with a Ready-Heat Blanket and a Heat Reflective Shell. The HRS will help to retain the heat produced by the Ready-Heat blanket. It has an incorporated hood and Velcro closures down each side to allow exposure of an arm or a leg. Such exposure allows the medic to attend to IVs and tourniquets.
	**Hypothermia Prevention** **•Key Point: Even a small decrease in body temperature can interfere with blood clotting and increase the risk of bleeding to death.** •Casualties in shock are unable to generate body heat effectively. •Wet clothes and helicopter evacuations increase body heat loss. •Remove wet clothes and cover casualty with hypothermia prevention gear. **•Hypothermia is much easier to prevent than to treat!**	Here we're not talking about hypothermia in the usual sense, which is dying from cold exposure. **Here we are talking about keeping your blood clotting system working!** Hypothermia is a problem for casualties with hemorrhagic shock even with warm ambient temperatures. Prevention of hypothermia is the key; once established it is difficult to reverse.
	**Tactical Field Care Guidelines** **9. Penetrating Eye Trauma** **If a penetrating eye injury is noted or suspected:** **a) Perform a rapid field test of visual acuity.** **b) Cover the eye with a rigid eye shield (NOT a pressure patch.)** **c) Ensure that the 400 mg moxifloxacin tablet in the combat pill pack is taken if possible, or that IV/IM antibiotics are given as outlined below if oral moxifloxacin cannot be taken.**	Read text

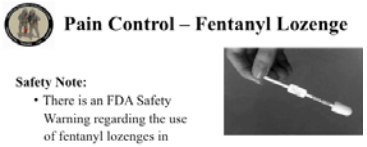
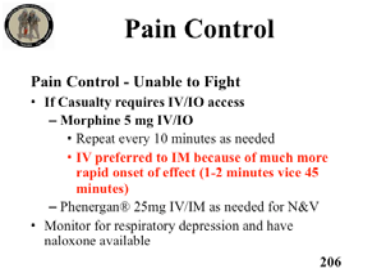
	**Checking Vision in the Field** •Don't worry about charts •Determine which of the following the casualty can see (start with "Read print" and work down the list if not able to do that.) –Read print –Count fingers –Hand motion –Light perception	Here's how you quantify vision in the field. Like everything else, vision measurement has to be simplified for battlefield use. NOTE: If vision is going down and the eye area is swelling rapidly, there may be a hemorrhage behind the eye and the casualty should be evacuated ASAP. Can happen with fragments that miss the eye but injure the orbit. He or she may permanently lose vision due to increased pressure in the eye if they don't get to a hospital ASAP.
	**Corneal Laceration**	This is a laceration to the cornea of the eye – the clear part in front. Eye contents can leak out if you have an injury like this and bacteria can get into the eye and cause an infection. EITHER of these two things is very bad.
	**Small Penetrating Eye Injury**	Note the dark spot at 10 o'clock in the circle where the clear part of the eye and the white part of the eye come together. The dark spot is a bit of iris, one of the pigmented parts from inside the eye, which is trapped in the penetrating wound. Attempts to "wipe" this spot away can cause more of the iris to be pulled out of the eye.
	**Protect the eye with a SHIELD, not a patch!**	A rigid shield will protect the eye from any pressure. Pressure could force the interior contents of the eye to come out – this is a BAD THING! Rigid shield should be in first aid kits and medical sets.

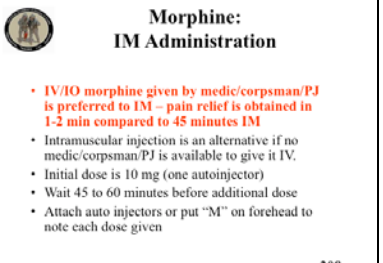
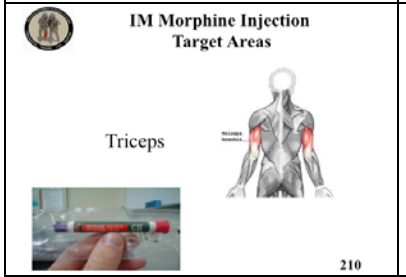
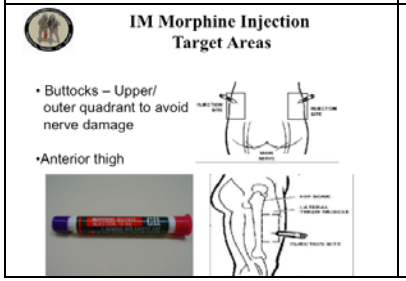
Eye Protection  • Use your tactical eyewear to cover the injured eye if you don't have a shield. • Using tactical eyewear in the field will generally prevent the eye injury from happening in the first place! 192	**Eye Protection** • **Use your tactical eyewear to cover the injured eye if you don't have a shield.** • **Using tactical eyewear in the field will generally prevent the eye injury from happening in the first place!**	Tactical eyeware can be used to protect the eye if no eye shield is available. Use of tactical eyeware is an excellent way to prevent this type of injury from happening in the first place.
 Both injuries can result in eye infections that cause permanent blindness – GIVE ANTIBIOTICS!	Both injuries can result in eye infections that cause permanent blindness – GIVE ANTIBIOTICS!	Infection inside the eye is also a BAD THING! Do you want your buddy's eye to look like this? If not, make sure he gets his antibiotics.
Tactical Field Care Guidelines **10. Monitoring** **Pulse oximetry should be available as an adjunct to clinical monitoring. Readings may be misleading in the settings of shock or marked hypothermia.** 194	**Tactical Field Care Guidelines** **10. Monitoring** **Pulse oximetry should be available as an adjunct to clinical monitoring. Readings may be misleading in the settings of shock or marked hypothermia.**	Read text
Pulse Oximetry Monitoring • Pulse oximetry – tells you how much oxygen is present in the blood • Shows the heart rate and the percent of oxygenated blood ("O2 sat") in the numbers displayed • 98% or higher is normal O2 sat at sea level. • 86% is normal at 12,000 feet – lower oxygen pressure at altitude  195	**Pulse Oximetry Monitoring** •Pulse oximetry – tells you how much oxygen is present in the blood •Shows the heart rate and the percent of oxygenated blood ("O2 sat") in the numbers displayed •98% or higher is normal O2 sat at sea level. •86% is normal at 12,000 feet – lower oxygen pressure at altitude	Here is what a pulse oximeter looks like and what it tells you. The device actually tells you the amount of oxygenated hemoglobin in the blood.

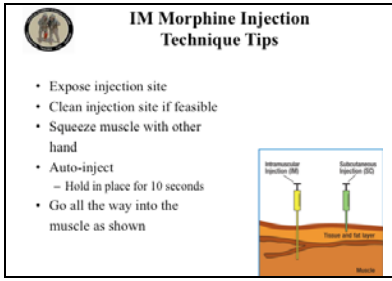
Pulse Oximetry Monitoring Consider using a pulse ox for these types of casualties: • TBI – good O2 sat very important for a good outcome • Unconscious • Penetrating chest trauma • Chest contusion • Severe blast trauma  196	**Pulse Oximetry Monitoring** **Consider using a pulse ox for these types of casualties:** •TBI – good O2 sat very important for a good outcome •Unconscious •Penetrating chest trauma •Chest contusion •Severe blast trauma	TBI casualties who become hypoxic have a worse outcome. Must watch them very closely for hypoxia. Unconscious casualties may experience an airway obstruction. Chest trauma and blast trauma casualties may not exchange oxygen well in their lungs.
Pulse Oximetry Monitoring Oxygen saturation values may be inaccurate in the presence of: • Hypothermia • Shock • Carbon monoxide poisoning • Very high ambient light levels  197	**Pulse Oximetry Monitoring** **Oxygen saturation values may be inaccurate in the presence of:** •Hypothermia •Shock •Carbon monoxide poisoning •Very high ambient light levels	A normal reading on a pulse oximeter is NOT a good indicator for absence of shock. Even after significant blood loss, the blood remaining in the intravascular compartment may be normally oxygenated. Readings on a cold limb may be artificially low. The pulse ox can mistake carbon monoxide for oxygen in burn patients and give a falsely high reading. To repeat – a decrease in O2 sat is normal at altitude. This drop in O2 sat is REAL.
Tactical Field Care Guidelines 11. Inspect and dress known wounds. 12. Check for additional wounds.  198	**Tactical Field Care Guidelines** **11. Inspect and dress known wounds.** **12. Check for additional wounds.**	Expose wounded areas using trauma shears – knives may cut the casualty as clothing is being removed.
Tactical Field Care Guidelines 13. Provide analgesia as necessary. a. Able to fight: *These medications should be carried by the combatant and self- administered as soon as possible after the wound is sustained.* - Mobic, 15 mg PO once a day - Tylenol, 650-mg bilayer caplet, 2 caplets PO every 8 hours 199	**Tactical Field Care Guidelines** **13. Provide analgesia as necessary.** **a. Able to fight:** ***These medications should be carried by the combatant and self- administered as soon as possible after the wound is sustained.*** **- Mobic, 15 mg PO once a day** **- Tylenol, 650-mg bilayer caplet, 2 caplets PO every 8 hours**	Read text

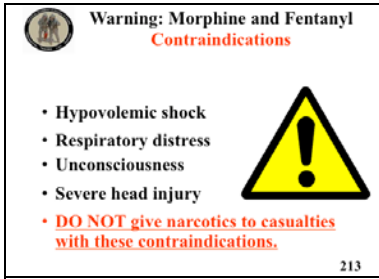
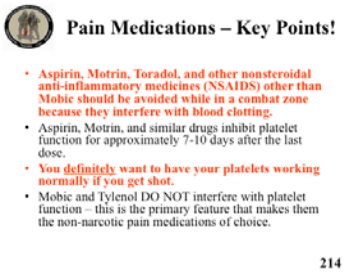
	**Tactical Field Care Guidelines** **13. Provide analgesia as necessary.** **b. <u>Unable to fight</u>** ***Note*: Have naloxone readily available whenever administering opiates.** **- Does not otherwise require IV/IO access** **- Oral transmucosal fentanyl citrate (OTFC), 800ug transbuccally** **- Recommend taping lozenge-on-a-stick to casualty's finger as an added safety measure** **- Reassess in 15 minutes** **- Add second lozenge, in other cheek, as necessary to control severe pain.** **- Monitor for respiratory depression.**	Oral transmucosal fentanyl citrate (Actiq®) is a solid formulation of fentanyl in the form of a lozenge on a plastic stick. It dissolves slowly in the mouth and is absorbed across the mucous membranes of the cheek and gums. Injectable forms of fentanyl in vials are not absorbed in this way, and so cannot be squirted under the tongue, though this has been tried in the past.
	**Tactical Field Care Guidelines** **13. Provide analgesia as necessary** **b. <u>Unable to fight</u>** **- IV or IO access obtained:** **- Morphine sulfate, 5 mg IV/IO** **- Reassess in 10 minutes.** **- Repeat dose every 10 minutes as necessary to control severe pain.** **- Monitor for respiratory depression** **c. Promethazine, 25 mg IV/IO/IM every 6 hours as needed for nausea or for synergistic analgesic effect**	Read text

	**Pain Control** **Pain Control When Able to fight:** •Mobic and Tylenol are the medications of choice •Both should be packaged in a COMBAT PILL PACK and taken by the casualty as soon as feasible after wounding. **•Mobic and Tylenol DO NOT cause a decrease in state of consciousness and DO NOT interfere with blood clotting.** •Medications like aspirin, Motrin, and Toradol DO interfere with blood clotting and should not be used by combat troops in theater.	**IF YOU GIVE A CASUALTY NARCOTICS, YOU ARE TAKING HIM OUT OF THE FIGHT.** Try to avoid that unless the casualty's pain is severe. The combination of Mobic and Tylenol can give significant pain relief to casualties who are able to continue as combatants.
	**Pain Control – Fentanyl Lozenge** **Pain Control - Unable to Fight** •If casualty does not otherwise require IV/IO access –Oral transmucosal fentanyl citrate, 800 µg (between cheek and gum) **–VERY FAST-ACTING; WORKS ALMOST AS FAST AS IV MORPHINE** **–VERY POTENT PAIN RELIEF**	This medication has been used extensively in Special Operations forces in the GWOT and has worked very well. Saves the time of starting an IV and works as well as IV morphine.
	**Pain Control – Fentanyl Lozenge** **Dosing and Precautions** •Tape fentanyl "lozenge on a stick" to casualty's finger as an added safety measure •Re-assess in 15 minutes •Add second lozenge in other cheek if needed •Respiratory depression very unlikely – especially if only 1 lozenge is used •Monitor for respiratory depression and have naloxone (Narcan) (0.4 - 2.0mg IV) ready to treat	Fentanyl lozenge should be attached to the casualty's finger to avoid oversedation. If the casualty becomes drowsy the arm will fall, pulling the OTFC out of the casualty's mouth, and preventing overmedication. Whenever morphine or fentanyl are administered, the medic or corpsman should have a narcotic antagonist at hand to counteract these agents in cases of respiratory depression. In cases of respiratory depression, be prepared to support respiration as needed. Continued re-assessment of the casualty is imperative.

	**Pain Control – Fentanyl Lozenge** **Safety Note:** •There is an FDA Safety Warning regarding the use of fentanyl lozenges in individuals who are not narcotic tolerant. •Multiple studies have demonstrated safety when used at the recommended dosing levels, BUT NOTE: **•DON'T USE TWO WHEN ONE WILL DO!**	Important note regarding fentanyl use. Respiratory depression at the 800-microgram dose level has not been noted in 10 years of combat experience. If it does occur, start an IV and give Narcan.
	**Pain Control** **Pain Control - Unable to Fight** **•If Casualty requires IV/IO access** **–Morphine 5 mg IV/IO** •Repeat every 10 minutes as needed **•IV preferred to IM because of much more rapid onset of effect (1-2 minutes vice 45 minutes)** –Phenergan® 25mg IV/IM as needed for N&V •Monitor for respiratory depression and have naloxone available	Don't be afraid to use morphine or other narcotic analgesics for severe pain AS LONG THEY ARE NOT CONTRAINDICATED. Give enough to relieve the pain. Be aware of side effects of hypotension or respiratory depression. Morphine Carpujects come in assorted dosing formulations; from 2mg to 10mg. Ensure you know the total dose of the Carpujects you are carrying. Carrying 10 mg Carpujects is recommend so you can give a second 5mg dose if needed.
	**Morphine Carpuject for Intravenous Use**	Photos of what a morphine Carpuject looks like. This can be given IV, not just IM like the auto-injectors.

	**Morphine: IM Administration** **•IV/IO morphine given by medic/corpsman/PJ is preferred to IM – pain relief is obtained in 1-2 min compared to 45 minutes IM** •Intramuscular injection is an alternative if no medic/corpsman/PJ is available to give it IV. •Initial dose is 10 mg (one autoinjector) •Wait 45 to 60 minutes before additional dose •Attach auto injectors or put "M" on forehead to note each dose given	Point of emphasis – IM morphine is not a good way to manage combat trauma pain. **This point that IM morphine works poorly was made VERY CLEARLY by the combat medical personnel at the TCCC First Responder Conference held in Tampa in September 2008.**
	**Morphine Auto-Injector for IM (intramuscular) Injection**	This is what a morphine auto-injector looks like.
	**IM Morphine Injection Target Areas** Triceps	Everybody grab your triceps muscle!
	**IM Morphine Injection Target Areas** • Buttocks – upper/outer quadrant to avoid nerve damage •Anterior thigh	Everybody grab your anterior thigh! Anybody NOT know where his or her buttocks are??? Now locate the upper/outer quadrant of this muscle. What is it called? The gluteus maximus. Emphasize the importance of giving buttocks injections in the upper/outer quadrant to avoid nerve damage.

	**IM Morphine Injection Technique Tips** •Expose injection site •Clean injection site if feasible •Squeeze muscle with other hand •Auto-inject –Hold in place for 10 seconds •Go all the way into the muscle as shown	Want to make sure that you get the auto-injector into the muscle.

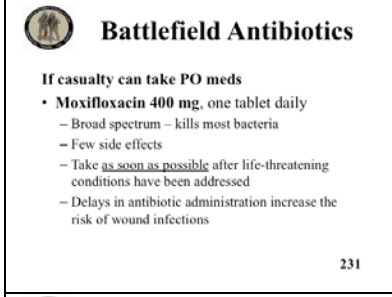
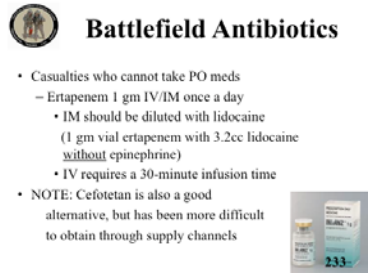
	**Warning: Morphine and Fentanyl Contraindications** **•Hypovolemic shock** **•Respiratory distress** **•Unconsciousness** **•Severe head injury** **•DO NOT give narcotics to casualties with these contraindications.**	You can kill your casualty if you forget this slide.
	**Pain Medications – Key Points!** **•Aspirin, Motrin, Toradol, and other nonsteroidal anti-inflammatory medicines (NSAIDS) other than Mobic should be avoided while in a combat zone because they interfere with blood clotting.** •Aspirin, Motrin, and similar drugs inhibit platelet function for approximately 7-10 days after the last dose. **•You definitely want to have your platelets working normally if you get shot.** •Mobic and Tylenol DO NOT interfere with platelet function – this is the primary feature that makes them the non-narcotic pain medications of choice.	Nobody who might be going into combat in a week or less should EVER get aspirin, Motrin, or similar drugs. Mobic is the only NSAID that does not interfere with blood clotting. Applies to sick call at base as well as in the field.

Tactical Field Care Guidelines 14. Splint fractures and recheck pulse.  215	**Tactical Field Care Guidelines** **14. Splint fractures and recheck pulse.**	Read text
Fractures: Open or Closed • Open Fracture – associated with an overlying skin wound • Closed Fracture – no overlying skin wound Open fracture Closed fracture 	**Fractures: Open or Closed** **•Open Fracture – associated with an overlying skin wound** **•Closed Fracture – no overlying skin wound**	Open fractures present a major threat of serious infection.
Clues to a Closed Fracture • Trauma with significant pain AND • Marked swelling • Audible or perceived snap • Different length or shape of limb • Loss of pulse or sensation distally • Crepitus (“crunchy” sound) 217	**Clues to a Closed Fracture** **•Trauma with significant pain AND** **•Marked swelling** **•Audible or perceived snap** **•Different length or shape of limb** **•Loss of pulse or sensation distally** **•Crepitus (“crunchy” sound)**	What are the warning signs that an arm or leg might be fractured?
Splinting Objectives • Prevent further injury • Protect blood vessels and nerves - Check pulse before and after splinting • Make casualty more comfortable  218	**Splinting Objectives** **•Prevent further injury** **•Protect blood vessels and nerves** **- Check pulse before and after splinting** **•Make casualty more comfortable**	Why do we take the time to splint fractures?

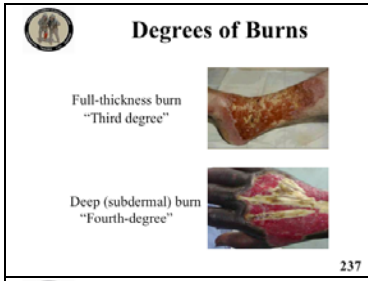
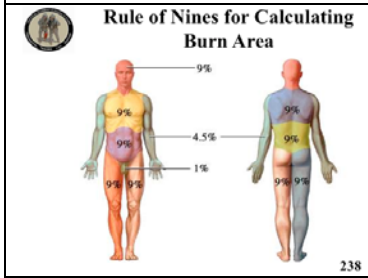
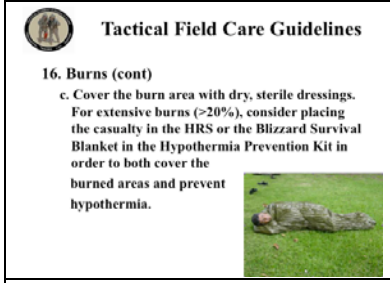
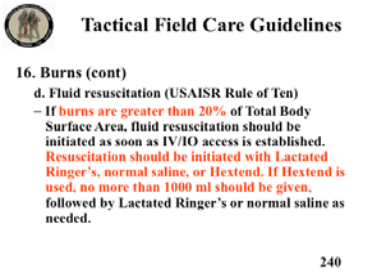
Principles of Splinting • Check for other injuries • Use rigid or bulky materials • Try to pad or wrap if using rigid splint • Secure splint with ace wrap, cravats, belts, duct tape • Try to splint before moving casualty 219	**Principles of Splinting** •Check for other injuries •Use rigid or bulky materials •Try to pad or wrap if using rigid splint •Secure splint with ace wrap, cravats, belts, duct tape •Try to splint before moving casualty	Here are some of the things that you want to do when splinting a fracture.
Principles of Splinting • Minimize manipulation of extremity before splinting • Incorporate joint above and below • Arm fractures can be splinted to shirt using sleeve • Consider traction splinting for mid-shaft femur fractures • Check distal pulse and skin color before and after splinting  220	**Principles of Splinting** •Minimize manipulation of extremity before splinting •Incorporate joint above and below •Arm fractures can be splinted to shirt using sleeve •Consider traction splinting for mid-shaft femur fractures •Check distal pulse and skin color before and after splinting	And a few more. The splint shown is a traction splint.
Things to Avoid in Splinting • Manipulating the fracture too much and damaging blood vessels or nerves • Wrapping the splint too tight and cutting off circulation below the splint  221	**Things to Avoid in Splinting** •Manipulating the fracture too much and damaging blood vessels or nerves •Wrapping the splint too tight and cutting off circulation below the splint	You can do harm with splinting as well.
Commercial Splints   222	**Commercial Splints**	Pneumatic splint and flexible-type splint shown

Field-Expedient Splint Materials • Shirt sleeves/safety pins • Weapons • Boards • Boxes • Tree limbs • ThermaRest pad  223	**Field-Expedient Splint Materials** **•Shirt sleeves/safety pins** **•Weapons** **•Boards** **•Boxes** **•Tree limbs** **•ThermaRest pad**	Remember to pad rigid splints. **If you use a weapon as a splint – don't forget to unload and safe it first!**
Don't Forget!  Pulse, motor and sensory checks before and after splinting 224	**Don't Forget!** **Pulse, motor and sensory checks before and after splinting**	Most important aspect of splinting is to splint in a way that does not harm the nerves or blood vessels to the extremity. Check for this by assessing circulation and motor and sensory status before and after splinting.
Splinting Practical  225	**Splinting Practical**	
Tactical Field Care Guidelines 15. Antibiotics: recommended for all open combat wounds: a. If able to take PO meds: - Moxifloxacin, 400 mg PO one a day b. If unable to take PO (shock, unconsciousness): - Cefotetan, 2 g IV (slow push over 3-5 minutes) or IM, every 12 hours or - Ertapenem, 1 g IV/IM once a day 226	**Tactical Field Care Guidelines** **15. Antibiotics: recommended for all open combat wounds:** **a. If able to take PO meds:** **- Moxifloxacin, 400 mg PO one a day** **b. If unable to take PO (shock, unconsciousness):** **- Cefotetan, 2 g IV (slow push over 3-5 minutes) or IM, every 12 hours** **or** **- Ertapenem, 1 g IV/IM once a day**	Why not Rocephin? Some people suggest that as an alternative. Rocephin does not cover for anaerobic bacteria – big hole in its coverage Should also irrigate wound with clean water if possible – also reduces chance of infection

Outcomes: Without Battlefield Antibiotics • Mogadishu 1993 • Casualties: 58 • Wound Infections: 16 • Infection rate: 28% • Time from wounding to Level II care – 15 hrs *Mabry et al J Trauma 2000* 	**Outcomes: Without Battlefield Antibiotics** •Mogadishu 1993 •Casualties: 58 •Wound Infections: 16 •Infection rate: 28% •Time from wounding to Level II care – 15 hrs	Why bother giving antibiotics? Why not just wait until they get to the hospital? ANTIBIOTICS MUST BE GIVEN EARLY TO PREVENT WOUND INFECTIONS. WOUND INFECTIONS CAN KILL THE CASUALTY OR DELAY HIS RECOVERY. Let's look at three examples.
Outcomes: With Battlefield Antibiotics Tarpey – AMEDD J 2005: – 32 casualties with open wounds – All received battlefield antibiotics – None developed wound infections – Used TCCC recommendations modified by availability: • Levofloxacin for an oral antibiotic • IV cefazolin for extremity injuries • IV ceftriaxone for abdominal injuries. 228	**Outcomes: With Battlefield Antibiotics** **Tarpey – AMEDD J 2005:** **–32 casualties with open wounds** **–All received battlefield antibiotics** **–None developed wound infections** **–Used TCCC recommendations modified by availability:** **•Levofloxacin for an oral antibiotic** **•IV cefazolin for extremity injuries** **•IV ceftriaxone for abdominal injuries.**	Huge improvement over the wound infection rate seen in Mogadishu.
Outcomes: With Battlefield Antibiotics • MSG Ted Westmoreland • Special Operations Medical Association presentation 2004 • Multiple casualty scenario involving 19 Ranger and Special Forces WIA as well as 30 Iraqi WIA • 11-hour delay to hospital care • Battlefield antibiotics given • No wound infections developed in this group. 229	**Outcomes: With Battlefield Antibiotics** **•MSG Ted Westmoreland** **•Special Operations Medical Association presentation 2004** **•Multiple casualty scenario involving 19 Ranger and Special Forces WIA as well as 30 Iraqi WIA** **•11-hour delay to hospital care** **•Battlefield antibiotics given** **•No wound infections developed in this group.**	USE battlefield antibiotics.
Battlefield Antibiotics  Recommended for all open wounds on the battlefield! 230	**Battlefield Antibiotics** **Recommended for all open wounds on the battlefield!**	Even wounds much less severe than this warrant antibiotic coverage.

	**Battlefield Antibiotics** **If casualty can take PO meds** •**Moxifloxacin 400 mg**, one tablet daily –Broad spectrum – kills most bacteria –Few side effects –Take <u>as soon as possible</u> after life-threatening conditions have been addressed –Delays in antibiotic administration increase the risk of wound infections	Moxifloxacin – chosen after a careful review of available choices. Confirmed by multiple subsequent reviews of this topic. O'Connor – Military Medicine 2003 If you want to read about why moxifloxacin is the best choice for oral antibiotic in TCCC, this paper spells it out
	**Combat Pill Pack** **Mobic 15mg** **Tylenol ER 650mg, 2 caplets** **Moxifloxacin 400mg**	Best plan - pre-packaged PO pain meds and antibiotics in a foil pouch. These meds should be carried by EVERYONE in the unit and self-administered as soon as possible after sustaining a wound.
	**Battlefield Antibiotics** •Casualties who cannot take PO meds –Ertapenem 1 gm IV/IM once a day •IM should be diluted with lidocaine (1 gm ertapenem with 3.2cc lidocaine <u>without</u> epinephrine) •IV requires a 30-minute infusion time •NOTE: Cefotetan is also a good alternative, but has been more difficult to obtain through supply channels	For IV use – Reconstitute the contents of a 1 gram vial of ertapenem 10ml of 0.9% saline. Shake well to dissolve and immediately transfer to 50ml of 0.9% saline. Infuse over 30 minutes.. For IM use – Reconstitute the contents of a 1 gram vial of ertapenem with 3.2ml of 1% lidocaine injection (WITHOUT EPINEPHRINE). Shake well to dissolve and administer into a deep muscle mass (gluteal, lateral thigh). The reconstituted solution should be used within 1 hour after preparation.

Medication Allergies • Screen your units for drug allergies! • Patients with allergies to aspirin or other non-steroidal anti-inflammatory drugs should not use Mobic. • Allergic reactions to Tylenol are uncommon. • Patients with allergies to flouroquinolones, penicillins, or cephalosporins may need alternate antibiotics which should be selected by unit medical personnel during the pre-deployment phase. Check with your unit physician if unsure. 234	**Medication Allergies** **•Screen your units for drug allergies!** •Patients with allergies to aspirin or other non-steroidal anti-inflammatory drugs should not use Mobic. •Allergic reactions to Tylenol are uncommon. •Patients with allergies to flouroquinolones, penicillins, or cephalosporins may need alternate antibiotics that should be selected by unit medical personnel during the pre-deployment phase. **Check with your unit physician if unsure.**	Mobic should not be given to those who have experienced trouble breathing, hives or other allergic-type reactions after taking aspirin or other NSAIDs. Severe, rarely fatal, reactions have been reported in these patients. There are many classes of antibiotics. Individuals with known medication allergies should be identified as they may require a different class of antibiotic. Moxifloxacin (Avelox®) is a member of the flouroquinolone class. It is contraindicated in persons who have known allergic reactions to other flouroquinolones like NegGam® or Cipro®. Ertapenem (Invanz®) is a member of the carbapenem family of the beta lactam class of antibiotics. It is contraindicated in persons with known anaphylactic reactions to other beta lactams including penicillins and cephalosporins. Furthermore, since ertapenem is reconstituted with lidocaine for IM injection, it cannot be given to persons with known hypersensitivity to lidocaine.
Tactical Field Care Guidelines 16. Burns a. Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation. b. Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines. (see third slide)  235	**Tactical Field Care Guidelines** **16. Burns** **a. Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation.** **b. Estimate total body surface area (TBSA) burned to the nearest 10% using the Rule of Nines. (see third slide)**	Read text
Degrees of Burns Superficial burn "First Degree"  Partial thickness burn "Second degree"  236	**Degrees of Burns** Superficial burn - "First Degree" Partial thickness burn - "Second degree"	Here are some examples of different degrees of burns

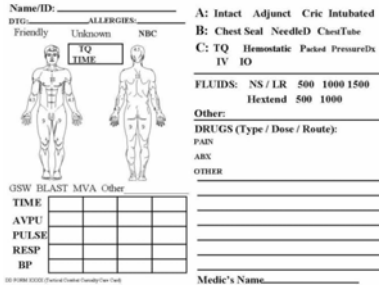
	**Degrees of Burns** Full-thickness burn - "Third degree" Deep (subdermal) burn - "Fourth-degree"	Here are more examples of different degrees of burns
	**Rule of Nines for Calculating Burn Area**	Note: Do not count **first –degree burns** in calculating TBSA burned
	**Tactical Field Care Guidelines** **16. Burns (cont)** **c. Cover the burn area with dry, sterile dressings. For extensive burns (>20%), consider placing the casualty in the HRS or the Blizzard Survival Blanket in the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia.**	Read text
	**Tactical Field Care Guidelines** **16. Burns (cont)** **d. Fluid resuscitation (USAISR Rule of Ten)** **–If burns are greater than 20% of Total Body Surface Area, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with Lactated Ringer's, normal saline, or Hextend. If Hextend is used, no more than 1000 ml should be given, followed by Lactated Ringer's or normal saline as needed.**	Read text

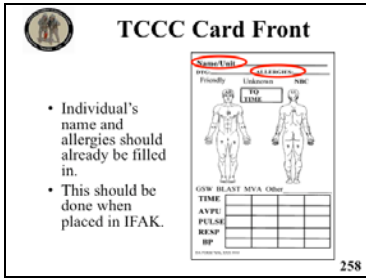
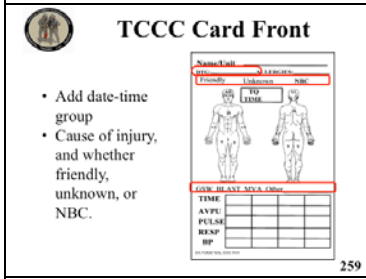
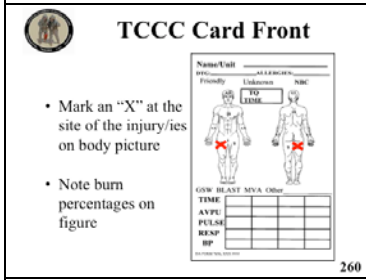
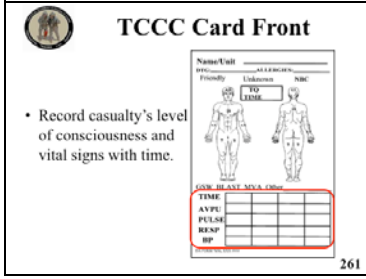
Tactical Field Care Guidelines 16. Burns (cont) – Initial IV/IO fluid rate is calculated as %TBSA x 10cc/hr for adults weighing 40-80 kg. – For every 10 kg ABOVE 80 kg, increase initial rate by 100 ml/hr. – If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the TCCC Guidelines in Section 7. 241	**Tactical Field Care Guidelines** **16. Burns (cont)** **–Initial IV/IO fluid rate is calculated as %TBSA x 10cc/hr for adults weighing 40-80 kg.** **–For every 10 kg ABOVE 80 kg, increase initial rate by 100 ml/hr.** **–If hemorrhagic shock is also present, resuscitation for hemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the TCCC Guidelines in Section 7.**	
Tactical Field Care Guidelines 16. Burns (cont) e. Analgesia in accordance with TCCC Guidelines in Section 13 may be administered to treat burn pain. f. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per TCCC guidelines in Section 15 if indicated to prevent infection in penetrating wounds. 242	**Tactical Field Care Guidelines** **16. Burns (cont)** **e. Analgesia in accordance with TCCC Guidelines in Section 13 may be administered to treat burn pain.** **f. Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per TCCC guidelines in Section 15 if indicated to prevent infection in penetrating wounds.**	Read text
Tactical Field Care Guidelines 16. Burns (cont) g. All TCCC interventions can be performed on or through burned skin in a burn casualty. *These casualties are "Trauma casualties with burns" - not the other way around* *US Army ISR Burn Center* 	**Tactical Field Care Guidelines** **16. Burns (cont)** **g. All TCCC interventions can be performed on or through burned skin in a burn casualty.** ***These casualties are "trauma casualties with burns" - not the other way around.*** ***US Army ISR Burn Center***	Read text
Tactical Field Care Guidelines 17. Communicate with the casualty if possible. - Encourage; reassure - Explain care 	**Tactical Field Care Guidelines** **17. Communicate with the casualty if possible.** **- Encourage; reassure** **- Explain care**	Read text

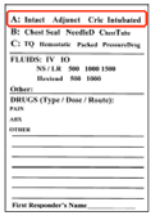
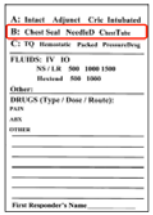
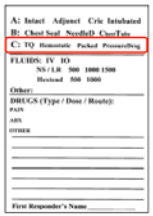
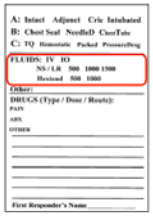
Tactical Field Care Guidelines **18. Cardiopulmonary resuscitation (CPR) Resuscitation on the battlefield for victims of blast or penetrating trauma who have no pulse, no ventilations, and no other signs of life will not be successful and should not be attempted.** However, casualties with torso trauma or polytrauma who have no pulse or respirations during TFC should have bilateral needle decompression performed to ensure they do not have a tension pneumothorax prior to discontinuation of care. The procedure is the same as described in section 3 above. 245	**Tactical Field Care Guidelines** **18. Cardiopulmonary resuscitation (CPR) Resuscitation on the battlefield for victims of blast or penetrating trauma who have no pulse, no ventilations, and no other signs of life will not be successful and should not be attempted.** **However, casualties with torso trauma or polytrauma who have no pulse or respirations during TFC should have bilateral needle decompression performed to ensure they do not have a tension pneumothorax prior to discontinuation of care. The procedure is the same as described in section 3 above.**	Read text
CPR  **NO battlefield CPR** 246	**NO battlefield CPR**	Why not???
CPR in Civilian Trauma • 138 trauma patients with prehospital cardiac arrest and in whom resuscitation was attempted. • No survivors • Authors recommended that trauma patients in cardiopulmonary arrest not be transported emergently to a trauma center even in a civilian setting due to large economic cost of treatment without a significant chance for survival. *Rosemurgy et al. J Trauma 1993* 247	**CPR in Civilian Trauma** •138 trauma patients with prehospital cardiac arrest and in whom resuscitation was attempted. •No survivors •Authors recommended that trauma patients in cardiopulmonary arrest not be transported emergently to a trauma center even in a civilian setting due to large economic cost of treatment without a significant chance for survival. *Rosemurgy et al. J Trauma 1993*	**Because CPR done for trauma patients in cardiac arrest DOES NOT WORK!** CPR may work SOMETIMES for cardiac patients without trauma – but not for trauma patients.

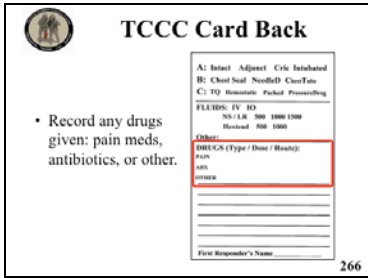
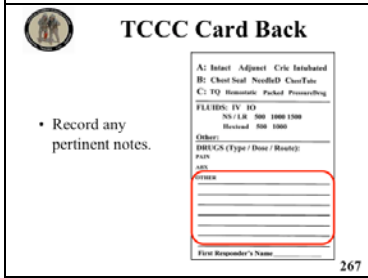
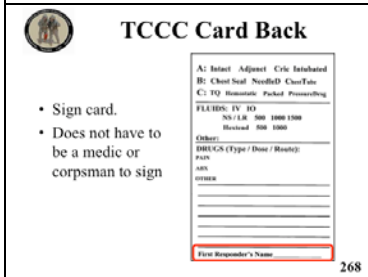
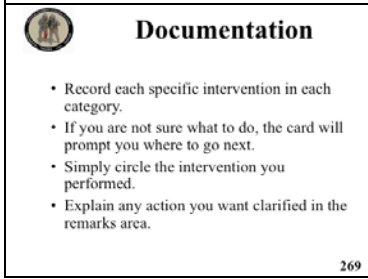
 **The Cost of Attempting CPR on the Battlefield** • CPR performers may get killed • Mission gets delayed • Casualty stays dead 248	**The Cost of Attempting CPR on the Battlefield** •**CPR performers may get killed** •**Mission gets delayed** •**Casualty stays dead**	In combat, futile attempts at CPR may interfere with caring for casualties who have a chance to survive and may interfere with the unit's ongoing mission.
 **CPR on the Battlefield (Ranger Airfield Operation in Grenada)** • Airfield seizure operation • Ranger shot in the head by sniper • No pulse or respirations • CPR attempts unsuccessful • Operation delayed while CPR performed • Ranger PA finally intervened: "Stop CPR and move out!" 249	**CPR on the Battlefield (Ranger Airfield Operation in Grenada)** •Airfield seizure operation •Ranger shot in the head by sniper •No pulse or respirations •CPR attempts unsuccessful •Operation delayed while CPR performed •Ranger PA finally intervened: "Stop CPR and move out!"	Real-world example A very large-scale operation could have been compromised by a tactical medicine mistake.
 **CPR in Tactical Settings** Only in the case of cardiac arrests from: – Hypothermia – Near-drowning – Electrocution – Other non-traumatic causes should CPR be considered prior to the Tactical Evacuation Care phase. 250	**CPR in Tactical Settings** Only in the case of cardiac arrests from: –Hypothermia –Near-drowning –Electrocution –Other non-traumatic causes should CPR be considered prior to the Tactical Evacuation Care phase.	There are some notable exceptions to this rule. Individuals with these disorders have a better chance of survival. Pretty rare for combat troops to have heart attacks in the middle of an op.

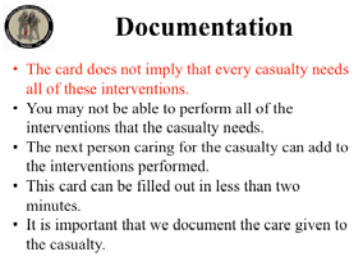
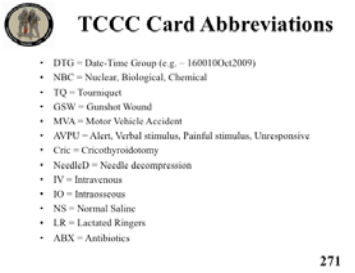
Traumatic Cardiac Arrest in TCCC • Mounted IED attack in March 2011 • Casualty unconscious from closed head trauma • Lost vital signs prehospital • CPR on arrival at hospital • **Bilateral needle decompression** done in ER • Rush of air from left-sided tension pneumothorax • Return of vital signs – life saved • This procedure is routinely done by Emergency Medicine physicians and Trauma Surgeons for trauma victims who lose their pulse and heart rate in the hospital Emergency Department. 251	**Traumatic Cardiac Arrest in TCCC** •Mounted IED attack in March 2011 •Casualty unconscious from closed head trauma •Lost vital signs prehospital •CPR on arrival at hospital •**Bilateral needle decompression** done in ER •Rush of air from left-sided tension pneumothorax •Return of vital signs – life saved •This procedure is routinely done by Emergency Medicine physicians and Trauma Surgeons for trauma victims who lose their pulse and heart rate in the hospital Emergency Department.	Though CPR for a combat casualty on the battlefield is contraindicated, bilateral needle decompression is not. This should be done before attempts at resuscitation are discontinued in any casualty who suffered polytrauma or torso trauma and lost vital signs. It is done to rule out tension pneumothorax. It could save a life if tension pneumothorax is present, and no harm will be done if it is not.
Questions?  252	**Questions?**	
Tactical Field Care Guidelines **19. Documentation of Care:** **Document clinical assessments, treatments rendered, and changes in the casualty's status on a TCCC Casualty Card. Forward this information with the casualty to the next level of care.** 253	**Tactical Field Care Guidelines** **19. Documentation of Care:** **Document clinical assessments, treatments rendered, and changes in the casualty's status on a TCCC Casualty Card. Forward this information with the casualty to the next level of care.**	Read text
TCCC Casualty Card • Designed by combat medics • Used in combat since 2002 • Replaces DD Form 1380 • Only essential information • Can be used by hospital to document injuries sustained and field treatments rendered • Heavy-duty waterproof or laminated paper 254	**TCCC Casualty Card** •Designed by combat medics •Used in combat since 2002 •Replaces DD Form 1380 •Only essential information •Can be used by hospital to document injuries sustained and field treatments rendered •Heavy-duty waterproof or laminated paper	Medical documentation may be difficult to accomplish in tactical settings. It is so important to the casualty's subsequent care that every effort should be made.

	**TCCC Casualty Card - DA Form 7656**  **Thanks to the 75th Ranger Regiment**	This is the TCCC Casualty Card. Developed by the Army Rangers and has worked very well for them.
TCCC Casualty Card • This card is based on the principles of TCCC. • It addresses the initial lifesaving care provided at the point of wounding. • Filled out by *whoever* is caring for the casualty. • Its format is simple with a circle or "X" in the appropriate block. 256	**TCCC Casualty Card** •This card is based on the principles of TCCC. •It addresses the initial lifesaving care provided at the point of wounding. •Filled out by *whoever* is caring for the casualty. •Its format is simple with a circle or "X" in the appropriate block.	Read text
Instructions • Follow the instructions on the following slides for how to use this form. • This casualty card should be in each Individual First Aid Kit. • Use an indelible marker to fill it out. • Attach it to the casualty's belt loop, or place it in their upper left sleeve, or the left trouser cargo pocket. • Include as much information as you can. 257	**Instructions** •Follow the instructions on the following slides for how to use this form. •This casualty card should be in each Individual First Aid Kit. •Use an indelible marker to fill it out. •Attach it to the casualty's belt loop, or place it in their upper left sleeve, or the left trouser cargo pocket. •Include as much information as you can.	Read text

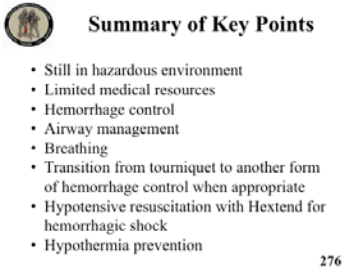
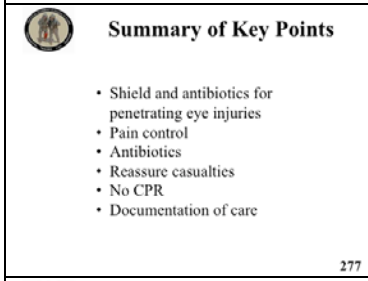
	**TCCC Card Front** •Individual's name and allergies should already be filled in. •This should be done when placed in IFAK.	Read instructions
	**TCCC Card Front** •Add date-time group •Cause of injury, and whether friendly, unknown, or NBC.	Read instructions
	**TCCC Card Front** •Mark an "X" at the site of the injury/ies on body picture •Note burn percentages on figure	Read instructions
	**TCCC Card Front** •Record casualty's level of consciousness and vital signs with time.	Read instructions

TCCC Card Back • Record airway interventions.  262	**TCCC Card Back** •Record airway interventions.	Read instructions
TCCC Card Back • Record breathing interventions.  263	**TCCC Card Back** •Record breathing interventions.	Read instructions
TCCC Card Back • Record bleeding control measures. • Don't forget tourniquet time on front of card.  264	**TCCC Card Back** •Record bleeding control measures. •Don't forget tourniquet time on front of card.	Read instructions
TCCC Card Back • Record route of fluid, type, and amount given.  265	**TCCC Card Back** •Record route of fluid, type, and amount given.	Read instructions

	**TCCC Card Back** •Record any drugs given: pain meds, antibiotics, or other.	Read instructions
	**TCCC Card Back** •Record any pertinent notes.	Read instructions
	**TCCC Card Back** •Sign card. •Does not have to be a medic or corpsman to sign	Read instructions
	**Documentation** •Record each specific intervention in each category. •If you are not sure what to do, the card will prompt you where to go next. •Simply circle the intervention you performed. •Explain any action you want clarified in the remarks area.	Read text

	**Documentation** •The card does not imply that every casualty needs all of these interventions. •You may not be able to perform all of the interventions that the casualty needs. •The next person caring for the casualty can add to the interventions performed. •This card can be filled out in less than two minutes. •It is important that we document the care given to the casualty.	Read text
	**TCCC Card Abbreviations** •DTG = Date-Time Group (e.g. – 160010Oct2009) •NBC = Nuclear, Biological, Chemical •TQ = Tourniquet •GSW = Gunshot Wound •MVA = Motor Vehicle Accident •AVPU = Alert, Verbal stimulus, Painful stimulus, Unresponsive •Cric = Cricothyroidotomy •NeedleD = Needle decompression •IV = Intravenous •IO = Intraosseous •NS = Normal Saline •LR = Lactated Ringers •ABX = Antibiotics	Review abbreviations
	**Questions ?**	

Further Elements of Tactical Field Care • Reassess regularly. • Prepare for transport. • Minimize removal of uniform and protective gear, but get the job done. • Replace body armor after care, or at least keep it with the casualty. He or she may need it again if there is additional contact. 273	**Further Elements of Tactical Field Care** •Reassess regularly. •Prepare for transport. •Minimize removal of uniform and protective gear, but get the job done. •Replace body armor after care, or at least keep it with the casualty. He or she may need it again if there is additional contact.	A few final points
Further Elements of Tactical Field Care Casualty movement in TFC may be better accomplished using litters.   274	**Further Elements of Tactical Field Care** Casualty movement in TFC may be better accomplished using litters.	Remember that we used carries and drags in Care Under Fire. We did it that way to get the casualty to cover as quickly as possible. Now we have time to use litters. Often better for moving casualty a long distance. Casualties do NOT have to be placed supine on a litter. The litter exists only to facilitate casualty movement. The casualty can be placed in the best position that facilitates their care and comfort. The casualty must, however, be secured to litter prior to movement.
Litter Carry Video • Secure the casualty on the litter • Bring his weapon  275	**Litter Carry Video** •Secure the casualty on the litter •Bring his weapon	(Click on photo to start video.) Remember - Don't let the casualty fall off of the litter!

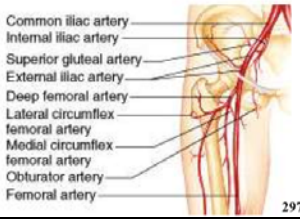
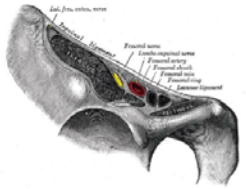
	**Summary of Key Points** •Still in hazardous environment •Limited medical resources •Hemorrhage control •Airway management •Breathing •Transition from tourniquet to another form of hemorrhage control when appropriate •Hypotensive resuscitation with Hextend for hemorrhagic shock •Hypothermia prevention	TFC takes place in a hazardous environment. The enemy may be close, and medical care may be far away. There is more time here than in Care Under Fire, but still, you should do only those aspects of care that are really important. Remember that your unit may have to move quickly at short notice.
	**Summary of Key Points** •Shield and antibiotics for penetrating eye injuries •Pain control •Antibiotics •Reassure casualties •No CPR •Documentation of care	Review
	**Questions?** **Wear your body armor!**	
	**Management of Wounded Hostile Combatants**	When you are taking care of casualties who were recently fighting for the other side, there are a few additional things to remember.

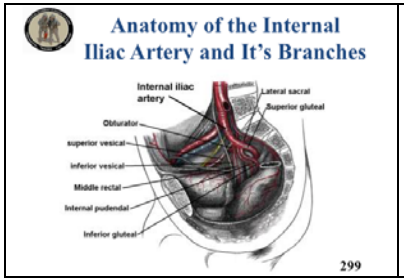
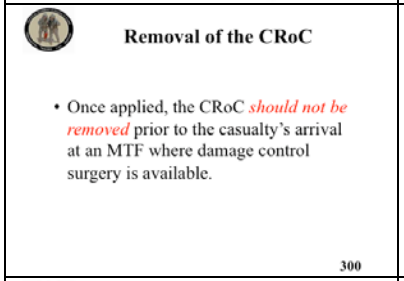
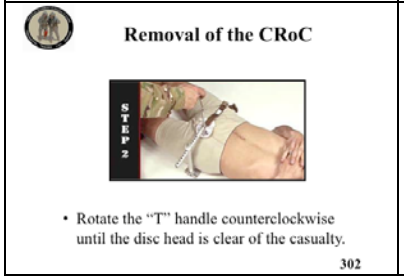
Objective • DESCRIBE the considerations in rendering trauma care to wounded hostile combatants. 280	**Objective** •DESCRIBE the considerations in rendering trauma care to wounded hostile combatants.	Read text
Care for Wounded Hostile Combatants • No medical care during Care Under Fire • Though wounded, enemy personnel may still act as hostile combatants – May employ any weapons or detonate any ordnance they are carrying • Enemy casualties are ***hostile combatants*** until they: – Indicate surrender – Drop all weapons – Are proven to no longer pose a threat 281	**Care for Wounded Hostile Combatants** •No medical care during Care Under Fire •Though wounded, enemy personnel may still act as hostile combatants –May employ any weapons or detonate any ordnance they are carrying **•Enemy casualties are *hostile combatants* until they:** **–Indicate surrender** **–Drop all weapons** **–Are proven to no longer pose a threat**	**Remember that wounded hostile combatants still represent a lethal threat.**
Care for Wounded Hostile Combatants • Combat medical personnel should not attempt to provide medical care until sure that wounded hostile combatant has been rendered safe by other members of the unit. • Restrain with flex cuffs or other devices if not already done. • Search for weapons and/or ordnance. • Silence to prevent communication with other hostile combatants. 282	**Care for Wounded Hostile Combatants** **•Combat medical personnel should not attempt to provide medical care until sure that wounded hostile combatant has been rendered safe by other members of the unit.** •Restrain with flex cuffs or other devices if not already done. •Search for weapons and/or ordnance. •Silence to prevent communication with other hostile combatants.	These are just VERY BASIC prisoner handling guidelines.
Care for Wounded Hostile Combatants • Segregate from other captured hostile combatants. • Safeguard from further injury. • Care as per TFC guidelines for U.S. forces after above steps are accomplished. • Speed to the rear as medically and tactically feasible  283	**Care for Wounded Hostile Combatants** •Segregate from other captured hostile combatants. •Safeguard from further injury. **•Care as per TFC guidelines for U.S. forces after above steps are accomplished.** •Speed to the rear as medically and tactically feasible	Once the hostile combatants have been searched and secured, the care provided should be the same as for U.S. and coalition forces per the Geneva Convention.

	***QUESTIONS?***	
Convoy IED Scenario • Recap from Care Under Fire • Your last medical decision during Care Under Fire: – Placed tourniquet on left stump • You moved the casualty behind cover and returned fire. • You provided an update to your mission commander 285	**Convoy IED Scenario** **•Recap from Care Under Fire** **•Your last medical decision during Care Under Fire:** **–Placed tourniquet on left stump** **•You moved the casualty behind cover and returned fire.** **•You provided an update to your mission commander**	OK – let's go back to our scenario that we started in Care Under Fire. Your element was in a five-vehicle convoy moving through a small Iraqi village when a command-detonated IED exploded under the second vehicle. The person next to you sustained bilateral mid-thigh amputations. He had heavy arterial bleeding from the left stump, and the right stump was only mildly oozing blood. Read text in this slide.
Convoy IED Scenario **Assumptions in discussing TFC in this scenario:** •Effective hostile fire has been suppressed. •Team Leader has directed that the unit will move. •Pre-designated HLZ for helicopter evacuation is 15 minutes away. •Flying time to hospital is 30 minutes. •Ground evacuation time is 3 hours. •Enemy threat to helicopter at HLZ estimated to be minimal. 286	**Convoy IED Scenario** **Assumptions in discussing TFC in this scenario:** •Effective hostile fire has been suppressed. •Team Leader has directed that the unit will move. •Pre-designated HLZ for helicopter evacuation is 15 minutes away. •Flying time to hospital is 30 minutes. •Ground evacuation time is 3 hours. •Enemy threat to helicopter at HLZ estimated to be minimal.	Read text HLZ = helicopter landing zone
Convoy IED Scenario Next decision (Command Element)? • How to evacuate casualty? – Helicopter • Longer time delay for ground evacuation • Enemy threat at HLZ acceptable 287	**Convoy IED Scenario** Next decision (Command Element)? •How to evacuate casualty? –Helicopter •Longer time delay for ground evacuation •Enemy threat at HLZ acceptable	Next decision? CASEVAC by air is chosen because it is significantly faster than ground CASEVAC in this scenario.

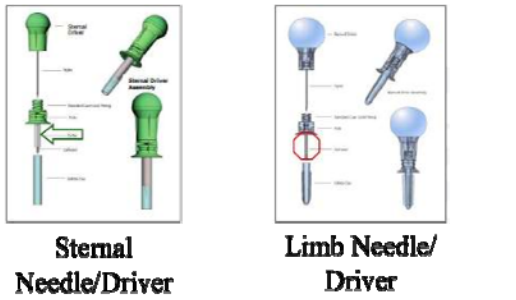
 **Convoy IED Scenario** Next decision (Command Element)? • Load first and treat enroute to HLZ or treat first and load after? – Load and Go – Why? • Can continue treatment enroute • Avoid potential second attack at ambush site 288	**Convoy IED Scenario** Next decision (Command Element)? •Load first and treat enroute to HLZ or treat first and load after? –Load and Go –Why? •Can continue treatment enroute •Avoid potential second attack at ambush site	Read text Get the unit off the X – the enemy now knows where you are.
 **Convoy IED Scenario** Casualty is still conscious and has no neck or back pain. Next decision? – Do you need spinal immobilization? – No • Not needed unless casualty has neck or back pain – Why? – Low expectation of spinal fracture in the absence of neck or back pain in a conscious casualty – Speed is critical – NOTE: Casualties who are unconscious from primary blast trauma should have spinal immobilization if feasible. 289	**Convoy IED Scenario** Casualty is still conscious and has no neck or back pain. Next decision? –Do you need spinal immobilization? –No •Not needed unless casualty has neck or back pain –Why? –Low expectation of spinal fracture in the absence of neck or back pain in a conscious casualty –Speed is critical –NOTE: Casualties who are unconscious from primary blast trauma should have spinal immobilization if feasible.	Read text
 **Convoy IED Scenario** Ten minutes later, you and the casualty are in a vehicle enroute to HLZ. Next action? • Reassess casualty – Casualty is now unconscious – No bleeding from first tourniquet site – Other stump noted to have severe bleeding 290	**Convoy IED Scenario** Ten minutes later, you and the casualty are in a vehicle enroute to HLZ. Next action? •Reassess casualty –Casualty is now unconscious –No bleeding from first tourniquet site –Other stump noted to have severe bleeding	Read text

Convoy IED Scenario • Next action? – Place tourniquet on 2nd stump • Next action? – Remove any weapons or ordnance that the casualty may be carrying. • Next action? – Place nasopharyngeal airway • Next action? – Make sure he's not bleeding heavily elsewhere – Check for other trauma 291	**Convoy IED Scenario** •Next action? –Place tourniquet on 2nd stump •Next action? –Remove any weapons or ordnance that the casualty may be carrying. •Next action? –Place nasopharyngeal airway •Next action? –Make sure he's not bleeding heavily elsewhere –Check for other trauma	Read text
Convoy IED Scenario • Next action? – Establish IV access - need to resuscitate for shock • Next action? – Administer 1 gram of tranexamic acid (TXA) in 100 cc NS or LR – Infuse slowly over 10 minutes – Only for SPEC OPS units 292	**Convoy IED Scenario** •Next action? –Establish IV access - need to resuscitate for shock •Next action? –Administer 1 gram of tranexamic acid (TXA) in 100 cc NS or LR –Infuse slowly over 10 minutes **–Only for SPEC OPS units**	Convoy IED Scenario will continue in TACEVAC
Convoy IED Scenario • Next action? – Infuse 500cc Hextend • Next actions – Hypothermia prevention – IV antibiotics – Pulse ox monitoring – Continue to reassess casualty 293	**Convoy IED Scenario** •Next action? –Infuse 500cc Hextend •Next actions –Hypothermia prevention –IV antibiotics –Pulse ox monitoring –Continue to reassess casualty	
Remember • **The TCCC guidelines are not a rigid protocol.** • **The tactical environment may require some modifications to the guidelines.** • **Think on your feet!** 	**Remember** • **The TCCC guidelines are not a rigid protocol.** • **The tactical environment may require some modifications to the guidelines.** • **Think on your feet!**	Every tactical scenario will have some features that are unique and that may require some change to your plan.

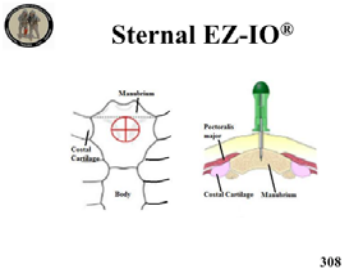
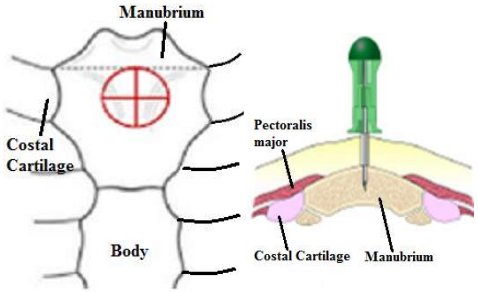
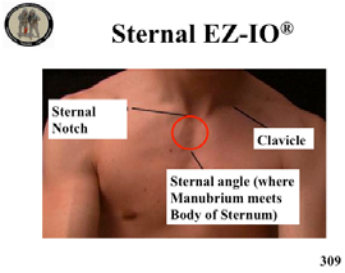
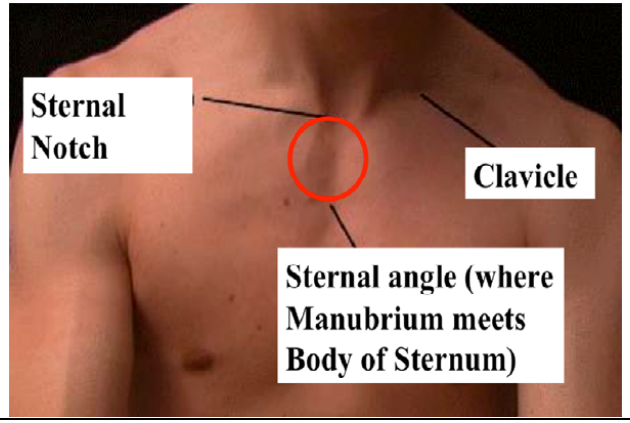
Questions?  295	**Questions?**	
 **Back-Up Slides** 296	**Back-Up Slides**	
 **Anatomy of the Inguinal Region - Right Groin**  297	**Anatomy of the Inguinal Region - Right Groin**	
 **Cross Section of Right Groin at Inguinal Ligament**  298	**Cross Section of Right Groin at Inguinal Ligament**	

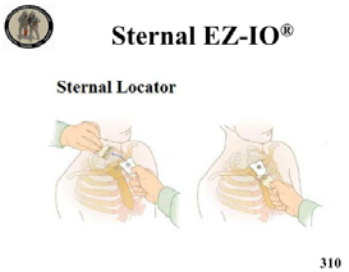
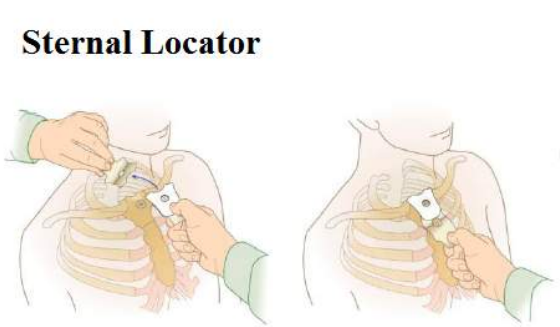
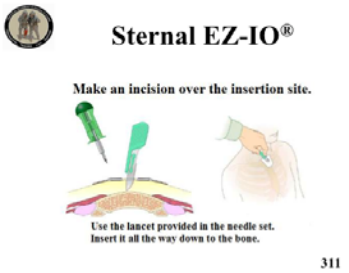
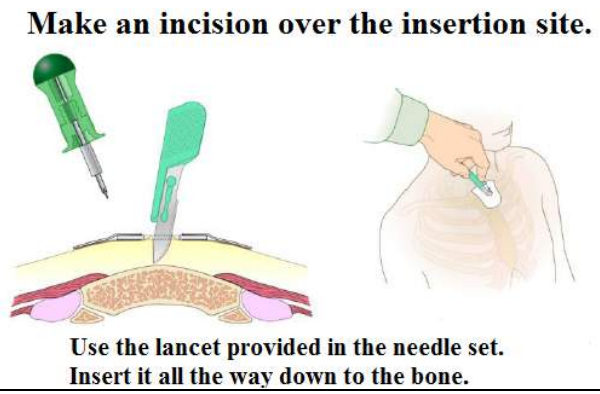
	**Anatomy of the Internal Iliac Artery and It's Branches**	
	**Removal of the CRoC** •Once applied, the CRoC *should not be removed* prior to the casualty's arrival at an MTF where damage control surgery is available.	Removal of the CRoC should be left to those who will provide surgical control of the bleeding. Reassessment in the field may, however, indicate a need for tightening or re-positioning.
	**Removal of the CRoC** •Remove the securing strap.	
	**Removal of the CRoC** •Rotate the "T" handle counterclockwise until the disc head is clear of the casualty.	

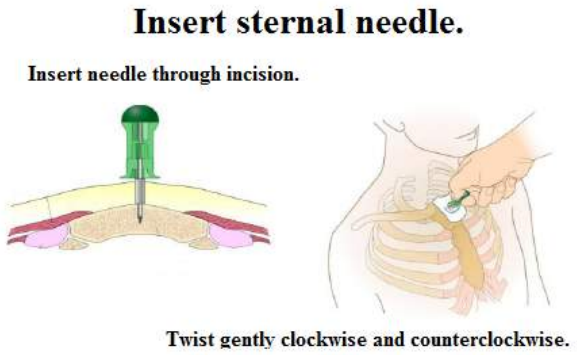
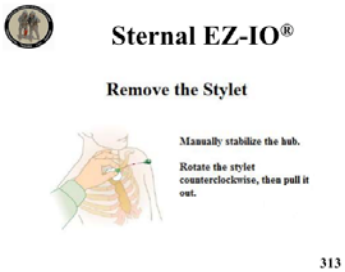
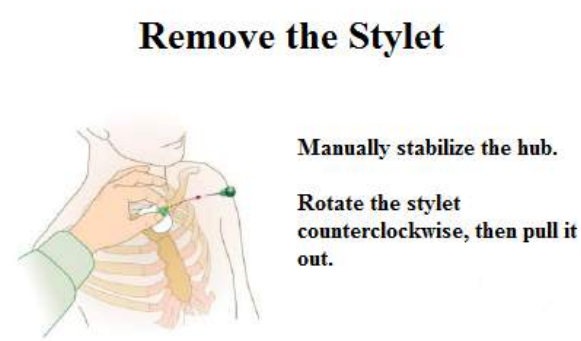
Removal of the CRoC  • Roll the casualty slightly on the uninjured side. • Slide the CRoC off. 303	**Removal of the CRoC** •Roll the casualty slightly on the uninjured side. •Slide the CRoC off.	
FAST1® Removal • Remove Protector Dome • Disconnect Infusion Tube • Pull Infusion Tube perpendicular to the manubrium in one continuous motion. Pull the tube, not the Luer lock. It is normal for the tube to stretch. • Remove Target Patch • Apply pressure over wound, then dress site.  304	**FAST1® Removal** •Remove Protector Dome •Disconnect Infusion Tube •Pull Infusion Tube perpendicular to the manubrium in one continuous motion. Pull the tube, not the Luer lock. It is normal for the tube to stretch. •Remove Target Patch •Apply pressure over wound, then dress site.	
Intraosseous Access with the Sternal EZ-IO® Needle Set 	**Intraosseous Access with the Sternal EZ-IO® Needle Set**	The Sternal EZ-IO® is used to obtain intraosseous vascular access in adults in whom rapid fluid resuscitation or pharmacological treatment is needed emergently, and standard IV access is not readily accessible.

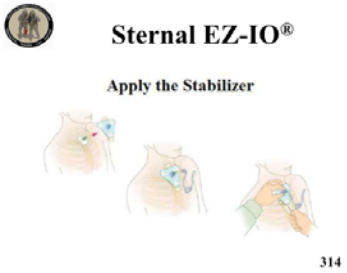
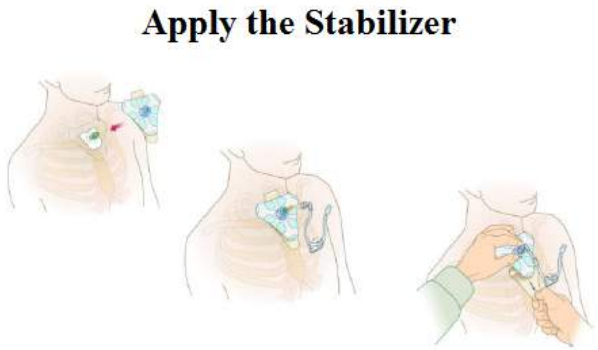
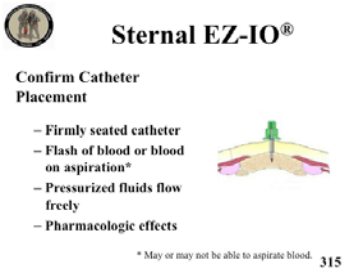
	**Sternal EZ-IO®** 	The ***Sternal*** EZ-IO® needle/driver set is green, and comes in green packaging. It is designed for insertion into the manubrium of the sternum, and should not be used for IO access at any other site. Conversely, the manual EZ-IO® needle/driver intended for use on the humerus or tibia is blue, and this needle should never be used on the sternum. The Sternal needle also has a depth limiting "collar" on the catheter that is not present on the catheter of the limb device.

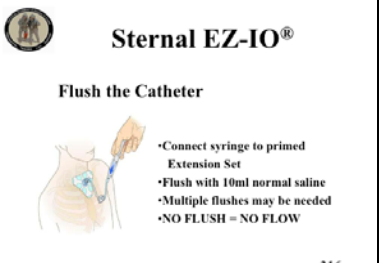
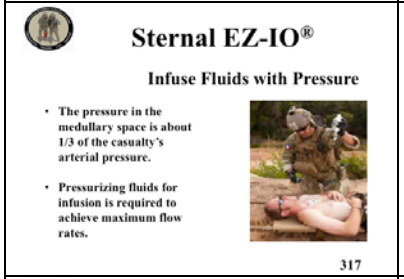
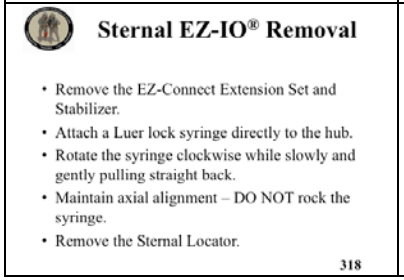
 **Sternal EZ-IO®** **Contraindications:** • Fracture of the manubrium •Previous surgical procedure •Manubrial IO within the past 24 – 48 hours •Infection at the insertion site •Inability to locate landmarks or excessive tissue over the target site 307	**Sternal EZ-IO®** **Contraindications:** • Fracture of the manubrium •Previous surgical procedure •Manubrial IO within the past 24 – 48 hours •Infection at the insertion site •Inability to locate landmarks or excessive tissue over the target site	If the manubrium is fractured, IO access through it should not be attempted. Fluid follows the path of least resistance. If an IO device is placed in a fractured bone, the fluid would simply extravasate into the surrounding tissue through the fracture site. You cannot count upon normal anatomy of the manubrium (nor adequate flow of fluids through it) if it has been previously disrupted by injury or surgery such as orthopedic replacement or cardiac procedures. If there is a surgical scar over the sternum, IO access should not be attempted there. Healing from a previous intraosseous insertion is defined as the point where another IO can be safely placed at the same anatomical site because clotting at the wound is sufficiently strong to prevent extravasation through the previous IO hole. This usually takes 24 to 48 hours. Placing an IO device through an infection in the tissues overlying the manubrium will likely spread the infection into the medullary cavity of the bone. The resulting osteomyelitis may require surgical removal of the infected bone, and loss of the protection the sternum provides to the heart. The target site for IO insertion in the manubrium is small, and accuracy with the needle is important. If anatomic landmarks used to guide insertion into the manubrium cannot be located for any reason, including excess subcutaneous fat overlying the sternum, then IO access there should not be attempted.

	**Sternal EZ-IO®** 	This is the target. With proper insertion, the needle tip should lie in the marrow cavity of the manubrium.
	**Sternal EZ-IO®** 	Expose the chest and identify the insertion site by palpation. The sternal insertion site is located midline – approximately 1-2cm below the sternal notch. Once the insertion site is identified, clean the area with alcohol or povidone-iodine.

	**Sternal EZ-IO®** 	Remove tab 1 from the sternal locator. Align the curve at the top of the sternal locator with the suprasternal notch, and adhere the top half of the sternal locator to the patient. Holding the sternal locator in place, pull tab 2 to expose the adhesive on the bottom half of the sternal locator. Press the sternal locator down on the chest to ensure it adheres to the casualty's skin.
	**Sternal EZ-IO®** 	Carefully nick the skin over the insertion site with provided lancet through the sternal locator. The length of the nick should not exceed 3mm, which is the width of the finger lancet and the opening in the sternal locator. IT IS IMPERATIVE THAT NICK REACHES ALL THE WAY DOWN TO STERNAL BONE AT THE INSERTION SITE. Failure to do so could lead to improper or failed placement.

	**Sternal EZ-IO®** 	Keep the casualty still while inserting the needle. Position the Sternal Needle Set at the insertion site with the needle **perpendicular to the plane of the manubrium**. Gently insert the Needle Set into the incision until the needle touches bone. Penetrate the bone cortex by rotating clockwise and counterclockwise while applying gentle, steady, downward pressure. Stop insertion when a sudden lack of resistance is felt upon entry into the medullary space. Do not rock or bend the Needle Set while you are inserting it - maintain the 90 degree angle. IMPORTANT: Use gentle steady pressure, not excessive force. Allow catheter tip rotation and gentle downward pressure to provide the penetrating action.
	**Sternal EZ-IO®** 	

	**Sternal EZ-IO®** 	Apply the Stabilizer to the catheter hub without removing the sternal locator. Once the Stabilizer is in position, prime the EZ-Connect Extension Set with normal saline, attach it to the catheter hub and tighten it firmly. Tightening of the EZ-Connect "locks" the catheter/stabilizer height into a fixed position. To secure the Stabilizer, hold the catheter still while pulling away each of the numbered tabs.
	**Sternal EZ-IO®** **Confirm Catheter Placement** **–Firmly seated catheter** **–Flash of blood or blood on aspiration*** **–Pressurized fluids flow freely** **–Pharmacologic effects** * May or may not be able to aspirate blood.	A firmly seated catheter, the ability to administer pressurized fluids without difficulty, and noting the pharmacologic effects of any fluids or medications given are indicators of successful cannulation of the medullary space. Confirmation of catheter placement can be achieved by aspiration. Attach a syringe to the primed Extension Set, and slowly retract the plunger to withdraw marrow. If marrow is present, the needle has been successfully placed in the medullary space. Blood may also be noted in the hub of the needle when you remove the stylet. **Absence of blood or inability to withdraw aspirate at the catheter hub does not mean the insertion was unsuccessful.** Once catheter placement has been confirmed, the site should be continually re-evaluated for signs of extravasation, fluid leakage, or any other signs that indicate the needle tip is no longer in the medullary space.

	**Sternal EZ-IO®** **Flush the Catheter** **•Connect syringe to primed Extension Set** **•Flush with 10ml normal saline** **•Multiple flushes may be needed** **•NO FLUSH = NO FLOW**	The intraosseous space is occupied by bone marrow which is held in place by a thick fibrin network. In order to obtain maximum flow rates, you must displace this fibrin mesh. This is achieved with a rapid 10ml flush with normal saline. The initial flush will be met with inherent resistance as the fibrin mesh is being displaced. After the first vigorous flush of normal saline, fluid flow through the IO device should be easy and rapid. Occasionally, more than one flush may be required to obtain maximum flow rates. Remember - NO FLUSH, NO FLOW. If this step is omitted, optimal flow rates will not be achieved.
	**Sternal EZ-IO®** **Infuse Fluids with Pressure** **•The pressure in the medullary space is about 1/3 of the casualty's arterial pressure.** **•Pressurizing fluids for infusion is required to achieve maximum flow rates.**	
	**Sternal EZ-IO® Removal** •Remove the EZ-Connect Extension Set and Stabilizer. •Attach a Luer lock syringe directly to the hub. •Rotate the syringe clockwise while slowly and gently pulling straight back. •Maintain axial alignment – DO NOT rock the syringe. •Remove the Sternal Locator.	